



Netværk for Kvinder i Fysik

Nyhedsbrev nr. 40

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Kære Netværksmedlemmer,

KIF har fået ny bestyrelse. Dens sammensætning, nyt fra bestyrelsen og formandens beretning for den foregående bestyrelsesperiode kan ses på de følgende sider.

Der er som omtalt i tidligere numre af nyhedsbrevet blevet taget initiativ til at stifte et nordisk netværk for kvinder i fysik, NorWiP. I den forbindelse blev der afholdt en nordisk workshop for kvinder i fysik i Bergen i august 2005. Oplysninger om NorWiP og konferencen findes i artiklerne på side 7 og 8. Vi bringer også en artikel om IUPAP konferencen om kvinder i Fysik, der blev afholdt i Rio de Janeiro i år.

Nyhedsbrevet indeholder som sædvanlig en del udklip. I artiklen på s. 18 stilles f.eks. spørgsmålet om hvorvidt det er naturgivet at fysik betragtes som et mandefag.

Øvrige meddelelser: Birgitta Nordström har været med til at danne arbejdsgruppen *Women in Astronomy* under den Internationale Astronomiske Union (IAU). Vi Anja C. Andersen tillykke med at hun har modtaget EU's Descartes Communication Prize 2005.

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Den nye bestyrelse:

Formand

Cathrine Fox Maule

Center for Planetforskning
Juliane Maries Vej 30, 2100 København Ø
Tlf.: 3532 0522
foxmaule@gfy.ku.dk

Næstformand, Webredaktør, årsmøde- og mailingliste-ansvarlig

Tina Christensen

Danmarks Meteorologiske Institut
Lyngbyvej 100, 2100 København Ø
Tlf: 3915 7496, Fax: 3915 7461
tic@dmu.dk

Co-suppleant for formanden og nyhedsbrevsmedhjælp

Anja C. Andersen

Dark Cosmology Center
Juliane Maries Vej 30, 2100 København Ø
Tlf: 3532 5991
anja@astro.ku.dk

Nyhedsbrevsredaktør

Liv Hornekær

Institut for Fysik og Astronomi
Aarhus Universitet
Ny Munkegade, Bygn. 520, 8000 Århus C
Tlf.: 8942 3759
liv@phys.au.dk

Adresseliste-ansvarlig

Vibeke Jürgensen

QUP-centre, Institut for Fysik
Danmarks Tekniske Universitet
2800 Lyngby
Tlf: 4525 3330
vwj@fys.ku.dk

NorWiP-repræsentant

Karin Nordström Andersen

MIC, Department of Micro and Nanotechnology
Danmarks Tekniske Universitet
Bygning 345Ø, 2800 Kgs. Lyngby
Tlf: 4525 5759, Fax.: 4588 7762
kna@mic.dtu.dk

Ansvarlig for fyraftensmøder

Karina Lindberg

Danmarks Meteorologiske Institut
Lyngbyvej 100, 2100 København Ø
Tlf.: 3915 7447
kli@dmu.dk

Kasserer

Dorthe Posselt

IMFUFA, Roskilde Universitetscenter
Universitetsvej 1, Box 260, 4000 Roskilde
Tlf: 4674 2607, Fax: 4674 3020
dorthe@ruc.dk

DFS-repræsentant og pt. fungerende kasserer

Winnie Svendsen

Microelektronikcentret
Danmarks Tekniske Universitet
Ørsted Plads 349, 2800 Lyngby
Tlf: 4525 5731
ws@mic.dtu.dk

EU-repræsentant

Birgitta Nordström

Niels Bohr Institutet
Juliane Maries Vej 30, 2100 København Ø
Tlf: 3532 5420, Fax: 3532 5989
birgitta@astro.ku.dk

Gymnasierepræsentant

Eva Danielsen

Nærum Amtsgymnasium
Nærum Hovedgade 30, 2850 Nærum
Tlf: 4588 9961
ed@nagym.dk

Medlem uden portefølje

Katrine Krogh Andersen

Geofysik - Is og klima
Juliane Maries Vej 30, 2100 København Ø
Tlf: 3532 0530
email: kka@gfy.ku.dk

Suppleant

Tabitha Winter Madsen

Niels Bohr Institutet
Blegdamsvej 17, 2100 København Ø
Tlf: 3532 5235
tabita@nbi.dk

Nyt fra Bestyrelsen – November 2005

Af Cathrine Fox Maule

I august afholdtes den første workshop for Nordic Network for Women in Physics, som KIF var medarrangør af. Langt størstedelen af arbejdet med at arrangere den tre dage lange konference blev dog gjort lokalt i Bergen af Dorte Nørgaard Madsen og også Anna Lipniacka, samt en håndfuld effektive og flittige ph.d.-studerende. Konferencen havde over 100 deltagere, hvoraf langt de fleste kom fra de nordiske lande, men flere andre europæiske lande var også repræsenteret. Ved konferencen blev Nordic Network for Women in Physics officielt stiftet, og en NorWiP bestyrelse blev valgt bestående af: Karin Nordström Andersen (Danmark), Katri Huitu (Finland), Dorte Nørgaard Madsen (Norge) og Elisabeth Rachlew (Sverige).

I september blev der afholdt konstituerende bestyrelsesmøde i KIF. To tidligere bestyrelsesmedlemmer har valgt at træde ud af bestyrelsen, det er Iben Bloch Nielsen og Kirstine Berg Sørensen – begge skal have mange tak for deres indsats i bestyrelsen gennem mange år. Der er tre nye, der har valgt at indtræde i bestyrelsen, det er Karin Nordström Andersen, Katrine Krogh Andersen og Tabita Winter Madsen. Efter konstitueringen ser bestyrelsen således ud: Cathrine Fox Maule er formand, Tina Christensen er næstformand og webansvarlig, Liv Hornekær er nyhedsbrevsredaktør, Anja C. Andersen er nyhedsbrevsmedhjælp, Vibeke Jürgensen er adresseliste ansvarlig, Dorthe Posselt er kasserer, Winnie Svendsen DFS repræsentant, Birgitta Nordström er EU-repræsentant, Karina Lindberg ansvarlig for fyraftensmøder, Karin Nordström Andersen er NorWiP-repræsentant, Eva Danielsen er gymnasie-repræsentant, Katrine Krogh Andersen er alment bestyrelsesmedlem og Tabita Winter Madsen er suppleant.

Du kan hele tiden holde dig opdateret om KIF's arrangementer og finde flere detaljer om hvor og hvornår på vores hjemmeside www.kif.nbi.dk.

Formandens beretning 2005

af Cathrine Fox Maule

Året 2004-2005 har været et særdeles aktivt år i KIF.

Professional Women and Equality – a Scandinavian Perspective

Kun få dage efter årsmødet sidste år deltog jeg i et møde i Bergen med titlen "Professional Women and Equality – a Scandinavian Perspective". Mødet blev afholdt af "University Women of Europe", og en repræsentant fra KIF var inviteret til at holde et oplæg om FREJA-programmet. Invitationen var uden tvivl en følge af vores en-dags konference om FREJA-programmet i januar 2004. Et fyldigt referat af mødet har tidligere været trykt i Nyhedsbrevet, og jeg vil derfor ikke komme mere ind på det her.

Chikanepolitik

En af de mange ting, der er sket i årets løb, er at der er blevet fulgt noget op på det sexchikanemøde, vi afholdt i foråret 2004 på Niels Bohr Institutet. Emnet har siden været på dagsordenen i både samarbejdsudvalget og i institutbestyrelsen og det har medført, at der er implementeret en chikanepolitik på instituttet. Der er blevet udpeget 2 kontaktpersoner, en af hvert køn, som man kan henvende sig til, hvis man føler sig udsat for mobning eller chikane. Det, vi skal arbejde videre på nu, er at få en tilsvarende chikanepolitik indført andre steder.

Nordic Network for Women in Physics

For et år siden blev vi kontaktet af nogle kvindelige fysikere fra Bergen, der ønskede at lave en konference for kvindelige fysikere fra hele Norden i Bergen i august i år. Vi indvilgede i at hjælpe med at arrangere denne konference, og gik i gang med at undersøge mulighederne for at skaffe penge etc. Som tiden gik, voksede ambitionerne fra blot at lave en enkelt konference til at stifte et decideret Nordisk Netværk for Kvinder i Fysik (NorWiP, www.norwip.dk).

Indstillinger til forskningsrådet

I efteråret opfordrede Ministeriet for Videnskab, Teknologi og Udvikling institutioner og organisationer til at komme med forslag til medlemmer til de fem nye faglige forskningsråd. Ministeriet havde i deres skrivelse lagt vægt på, at man gerne så en mere lige kønsfordeling i de nye forskningsråd. I den forbindelse blev KIF-bestyrelsen enige om at foreslå medlemmer til Forskningsrådet for Natur og Univers. Vi indstillede Professor Dorthe Dahl-Jensen fra Københavns Universitet og lektor Dorthe Posselt fra Roskilde Universitetscenter. Dorthe Dahl-Jensen (der også havde indstilling fra mange andre steder) sidder nu i Forskningsrådet for Natur og Univers. Desværre kom Dorthe Posselt ikke ind denne gang, men der bliver mulighed for at lave indstillinger en anden gang.

Fyraftensmøder

I løbet af året har vi haft 3 fyraftensmøder. I efteråret havde vi kommunikationschef på det Naturvidenskabelige Fakultet, Anne-Marie Levy til at fortælle os om "Kommunikation af naturvidenskab – den stigende konkurrence". I januar kom Preben Hartmann-Petersen og fortalte os om "Curiefamiliens bidrag til radioaktivitetsbegrebet" – det var meget fascinerende at høre om de store personligheder, som Marie Curie og hendes nærmeste familie var. I april havde vi inviteret Kenneth Reinicke fra Center for Ligestillingsforskning på RUC, han fortalte om "Mænd og Kvinder

– Magt og Karriere”. Det var meget interessant at høre om hans studier, og jeg bemærkede især begrebet ”i-princippet-mænd”, en betegnelse for mænd, der i princippet er fuldt ligestillede, men som i praksis (ubevidst?) udøver forskelsbehandling.

Pigefrokoster

Igen gennem hele året har vi haft pigefrokoster på Københavns Universitet ca. en gang om måneden. Antallet af deltagere varierer meget fra 4 til 20, men især aktiviteten ved de sidste møder synes jeg har været opløftende, og det tyder på, at det er en aktivitet vi skal fortsætte med. Det vil være godt, hvis vi også kan få pigefrokoster igang på andre universiteter, men det kræver lokale initiativtagere.

FREJA-folderen

I løbet af vinteren har KIF i samarbejde med FERA (Female Economics Researchers in Aarhus) udarbejdet en folder om FREJA-programmet, der hedder ”Det kan betale sig at støtte kvinders forskning!”, folderen kan hentes elektronisk på KIF’s hjemmeside (www.kif.nbi.dk), eller kan fås ved henvendelse til Cathrine Fox Maule (på foxmaule@gfy.ku.dk). Folderen beskriver resultaterne af de 16 FREJA-projekter, både de videnskabelige resultater, men også hvad det har betydet for de kvindelige forskere at få FREJA-bevillingerne. Meningen med folderen er at udbrede det budskab at FREJA-programmet var en stor succes, og at samfundet på mange måder har fået meget ud af denne pulje af forskningsmidler. Håbet er, at hvis de rigtige politikere ser, hvor stor en succes FREJA var, så vil de arbejde på at lave et nyt FREJA. Fra KIF’s side har det været Anja C. Andersen og jeg selv der har arbejdet med folderen. Jeg vil gerne på vores vegne, dels takke Mette Verner og Helena Skyt Nielsen fra FERA for det gode samarbejde, dels vil jeg også takke John Renner Hansen fra Niels Bohr Institutet og Jan W. Thomsen fra Dansk Fysisk Selskab for den økonomiske støtte til tryk og distribution af folderen.

IUPAP’s 2nd International Conference on Women in Physics

I slutningen af maj var vi 2 fra KIF-bestyrelsen, Winnie Svendsen og jeg, der sammen med institutleder John Renner Hansen fra Niels Bohr Institutet deltog i IUPAP’s 2nd International Conference on Women in Physics. Danmark var et af de få lande, der havde en mandlig deltager med. Der vil senere i Nyhedsbrevet komme noget på tryk om vores indtryk og udbytte af konferencen. Her vil jeg blot nævne at umiddelbart efter mødet har John og jeg henvendt os til formanden for det Frie Forskningsråd med forslag til et virkemiddel, som forskningsrådssystemet kan benytte til at fremme ansættelserne af kvinder i videnskabelige stillinger i forskningsverdenen. Vores håb er, at man gennem forskningsrådssystemet kan lægge en national strategi for området, og ved at lave et virkemiddel, der kan udløse forskningsmidler til institutionerne, også stimulere institutioner, der ellers halter lidt bagefter til at gøre en aktiv indsats for at ansætte kvinder. En for mig interessant forberedelse af deltagelsen i IUPAP mødet var, at jeg blev bedt om at lave en evaluering over, hvad der har været af ændringer for kvinder i fysik i Danmark i de 3 år, der er gået siden sidste møde. Og, set tilbage over de sidste 3 år synes jeg faktisk vi har opnået en hel del. Der er blevet ansat flere kvinder i faste videnskabelige stillinger på universiteterne. I hvert fald 2 af universiteterne (SDU og NBI ved KU) har nu konkrete målsætninger for andelen af kvinder blandt det faste videnskabelige personale, og på NBI har vi fået gennemført en chikanepolitik, der forhåbentlig kan være med til at forbedre arbejdsmiljøet for alle på instituttet.

Tak til bestyrelsen

Til sidst vil jeg godt takke bestyrelsen for et godt og aktivt år. Det være sig næstformand Tina Christensen, der har lagt et stort arbejde i at arrangere Årsmødet, og som står for vores hjemmeside og mailinglister. Tak til Liv Hornekær og Iben Bloch Nielsen, som i det forgangne år har været

ansvarlige for Nyhedsbrevet, de har gjort et ualmindelig stort og godt arbejde. I den forbindelse vil jeg også takke Bodil Helt, som ikke sidder i bestyrelsen, men som igennem flere år har stået for trykningen af Nyhedsbrevet. Tak til Vibeke Jürgensen, der er vores medlems- og adresseansvalige. Tak til Karina Lindberg, som har arrangeret 3 spændende fyraftensmøder, og som også er i gang med at arrangere Nordic Workshop for Women in Physics. Det samme er Anja Andersen, som også skal have stor tak for arbejdet med FREJA-folderen. Tak til vores kasserer Dorte Posselt. Tak til Birgitta, der er vores EU-repræsentant og som vil fremlægge nogle af sine aktiviteter senere på Årsmødet. Tak til Winnie Svendsen, der er vores repræsentant i DFS's bestyrelse. Og tilsidst tak til suppleanterne Eva Danielsen og Kirstine Berg-Sørensen.

LÆSERBREV

Pigerne og globaliseringen

UDDANNELSE

af Lars Bytoft Olsen
fmd. for Ingeniørforeningen

Igen i år er det de dygtige piger, der snupper størstedelen af studiepladserne på de videregående uddannelser. Det skal ikke begrædes. For de danske piger er dygtige.

Alligevel er der behov for at dvæle lidt ved tendensen, der kan få alvorlige konsekvenser for Danmarks evne til at klare sig i den globale konkurrence.

Pigerne er nemlig ikke interesserede i de naturvidenskabelige fag – afspejlet ved at kun 21 pct. af de optagne på ingeniørstudiet i år er kvinder mod 55 pct. på universiteterne som helhed. En mangel på interesse der grundlægges i folkeskolen.

Skoletiden er den del af livet, hvor grundstenen til de unges fremtidige virke og valg lægges. Og det er bl.a. her, Danmark for alvor har behov for at tage fat.

I OECD's PISA-undersøgelse af de 15-åriges evner inden for natur og teknik fra år 2000 scorede Danmark bekymrende lavt, samtidig med at forskellen mellem drenge og piger var større end i de øvrige nordiske lande. En ny international undersøgelse har netop bekræftet, at de danske piger er de suverænt mindst interesserede i naturfag blandt de deltagende 47 lande.

Kvindelige fysiklærere

Problemet føres med over i det videregående uddannelsessystem. Pigerne overlader den teknologiske banehalvdel til drengene og går glip af chancen for nogle af de bedst betalte og mest udviklende job i det private erhvervsliv. Og virksomhederne går glip af en vigtig talentmasse.

En del af forklaringen på det ringe niveau generelt og hos pigerne især ligger i kommunerne. En undersøgelse fra Danmarks Lærerforening

(DLF) viser, at færre end hver fjerde kommune har taget initiativ til at forbedre undervisningen i natur og teknik (herunder fysik og kemi).

Det er et skræmmende tal. Særligt når vi ved, at pigers manglende interesse for naturfag primært skyldes, at den traditionelle tilgang til fagene er bedre egnet til at fange drenge end piger. Piger bliver ikke fanget af dampmaskiner. Undervisning i sundhed og miljø er meget mere vedkommende for pigerne.

Samtidig vil pigernes interesse for naturfag kunne skærpes, hvis vi fik flere kvindelige undervisere. En undersøgelse på fysikområdet viser, at faget bliver oplevet mere positivt af pigerne, når underviseren er en kvinde. Det er ikke en naturlov, at fysiklæreren skal være en midaldrende mand med fuldskæg.

Undersøgelsen fra DLF viser også, at de fleste undervisere inden for natur/teknik

ikke har det som linjefag. Og over halvdelen af dem er slet ikke blevet efteruddannet i de seneste 10 år. Enhver privat videnvirksomhed, der fejlbemandede og undlod at vedligeholde og udvikle de menneskelige ressourcer på den måde, ville for længst være udkonkurreret.

Vi er derfor i en ond cirkel, hvor mænd uden opdateret faglighed underviser på en måde, der måske tiltaler en lille gruppe af drengene, men samtidig afskrækker de fleste af pigerne. Vi er nødt til at få brudt denne cirkel. Vi har brug for pigerne. Det giver en bredere tilgang til tingene og sjovere arbejdspladser og dermed en bedre konkurrenceevne.

Derfor bør vi have en national handlingsplan for naturvidenskabelige område. En plan, der afspejler pædagogisk oprustning af undervisningen, og som pirrer pigernes interesse. Vi leverer gerne vores del af arbejdet.

Information, mandag d. 1 august 2005

Nordic Network for Women in Physics

Cathrine Fox Maule, PhD student, chairperson of Women in Physics in Denmark.
Niels Bohr Institute, Juliane Maries vej 30, 2100 Copenhagen Oe, foxmaule@gfy.ku.dk

On August 10th more than 100 primarily female physicists from the Nordic countries founded a Nordic Network for Women in Physics (NorWiP). This occurred at 1st Nordic Workshop for Women in Physics, which was sponsored by NordForsk. The purpose of NorWiP is to create contacts between female physicists for exchanging information and knowledge. The network will work for increasing the visibility of female physicists, and to identify and remove gender barriers for women pursuing a career in physics.

NorWiP will act as an umbrella organization for the national networks of female physicists in the Nordic countries. Denmark and Sweden have very active networks, whereas the Norwegian has been inactive in past years. However, after the 1st Nordic Workshop for Women in Physics held in Bergen August 8-10th, the Norwegian network is being re-established and a Finnish network is being started. NorWiP is going to act as a coordinating forum where the national networks can exchange ideas and strategies for obtaining their common goals.

The number of female physicists with permanent positions at the Nordic universities is so low that it is very difficult for young women to find female role models within their own discipline in their own country. Increasing the local networks of female physicists to a Nordic network, the pool of potential role models is increased. To facilitate contacts NorWiP is generating a data base of female physicists from or working in the Nordic countries. The data base contains brief biographical information about the scientists and can be used to find female physicists within specific disciplines of physics for either collaboration, for invited speakers, to sit in advisor committees etc.. The web site will also contain additional information of relevance, as e.g. a notice board of available positions and stipends and links to conferences regarding women in science (gender related conferences).

Besides the web site and the data base, the ambition for NorWiP is to hold a conference for all members every two or three years depending on funding. These meetings will like the 1st Nordic Workshop for Women in Physics have a scientific program, but also include talks on gender issues and workshops of relevance for especially the young scientists, concerning e.g. proposal writing or how to give good talks.

The president of the European Physical Society (EPS), Ove Poulsen, is happy about the new network. "The European Physical Society (EPS) welcomes NorWiP. The ROSE investigation shows that student involvement in science education is weak. One of the more distinct findings is the weak interest of girls and young women in science related issues. This is not an acceptable situation, neither from a democratic nor from a professional point of view. The formation of NorWiP is a most welcome initiative as it highlights these issues and supports the further development of physics. Physics is changing rapidly these years, not only professionally, but also sociologically due to the high average age of staff physicists. In the coming years it is important to focus on a diverse recruitment to physics. NorWiP supports this development by emphasising the importance of talented women to enter physics, and equally important, to stay in physics." says Ove Poulsen.

The first board of NorWiP consists of Dorte N. Madsen (Norway), Karin N. Andersen (Denmark), Elisabeth Rachlew (Sweden) and Katri Huitu (Finland). NorWiP is funded by the Danish Natural Research Council. For more information about NorWiP visit www.norwip.dk.

Nordisk Netværk for Kvinder i Fysik

af Anja C. Andersen¹ og Cathrine Fox Maule²

¹Dark Cosmology Center, Niels Bohr Institutet, Københavns Universitet

²Teoretisk Geofysik & Planetfysik, Niels Bohr Institutet, Københavns Universitet

Der er sket meget i fysik siden Einstein ifølge legenden sad på et patentkontor og udledte den specielle relativitetsteori. I løbet af de 100 år er kvinder blevet tilladt adgang til de højere uddannelser i samtlige af de Nordiske lande. Kvinders adgang til universiteterne har været en utrolig succeshistorie og idag er andelen af kvinder der starter et universitets studie af samme størrelsesorden som andelen af mænd. Udviklingen af andelen af kvinder i faste videnskabelige stillinger i fysik har dog ikke den samme klang af success over sig, se Tabel 1.

Table 1: Antallet af fastansatte kvinder i fysik ved et udvalg af Danske universiteter i 1975 og 2005. Tallene for 2005 er opgjort i September.

Universitet	1975	2005
Aarhus Universitet	0	0
Københavns Universitet	4	4
Roskilde Universitets Center	1	2
Syddansk Universitet	0	1
Ialt	5	7

Der er ingen af de Nordiske Universiteter hvor man behøver mere end én hånd for at kunne tælle andelen af kvindelige fastansatte forskere. Formålet med at øge antallet af kvindelige forskere er at forbedre udnyttelsen af Danmarks forskerpotentiale. En af de få initiativer der har været i Danmark for aktivt at gøde vækstlaget af kvinder i forskerverdenen samt fastholde kvinder i forskning var FREJA projektet der blev søsat i 1998. Hvordan det gik med de projekter kan læses i rapporten *Det betaler sig at støtte kvinders forskning*¹

Nordisk Netværk for Kvinder i Fysik (NorWiP) er en nystiftet paraply organization for de nationale kvinder i fysik netværk i de Nordiske lande; Netværk for Kvinder i Fysik i Danmark², Women in Physics in Sweden³, Nettverk for Kvinner i Fysikk i

¹<http://www.kif.nbi.dk/Freja2.pdf>

²<http://www.kif.nbi.dk>

³<http://www.wips.uu.se>



Figure 1: Gruppebillede af deltagerne til NorWiP mødet i Bergen.

Norge⁴ og det Finske Netværk for Kvinder i Fysik som pt. er under dannelse. Ideen med NorWiP er at fungere som et supplement til de nationale netværk. Målet med NorWiP er at øge andelen af kvinder i fysik i de Nordiske lande, ved at sætte focus på fordelingen af køn i den akademiske verden, samt ved at lobbie for initiativer der kan øge og fastholde kvinder i et akademisk karrierer forløb.

NorWiP blev etableret i Bergen i August 2005, i forbindelse med afholdelsen af det første nordiske møde for kvinder i fysik i anledning af Verdens Fysik året. Der var hundrede kvindelige fysikere fra samtlige af de fem nordiske lande og mødet forløb over to en halv dag. Programmet⁵ var en blanding af faglige foredrag inden for de forskellige fysik discipliner samt foredrag omhandlede køn i academia.

NorWiP har en hjemmeside⁶ der indeholder en database over kvindelige fysikere. Den håber vi vil blive brugt når der skal findes egnet medlemmer til råd, nævn, udvalg samt bedømmelser.

Forfatterne:

Anja C. Andersen er lektor ved Dark Cosmology Center, Niels Bohr Institutet, Københavns Universitet.

Cathrine Fox Maule har lige afleveret sin PhD ved Teoretisk Geofysik og Planetfysik, Niels Bohr Institutet, Københavns Universitet og er formand for Kvinder i Fysik i Danmark.

⁴<http://www.norskfysikk.no/hfs/NFKIF>

⁵<http://www.ift.uib.no/nwip2005/>

⁶<http://www.norwip.org>

Barsel øger kvinders ledighed

Kvindelige ingeniører har godt 30 procent større risiko for at blive ledige end deres mandlige kolleger. Kun en barselsfond vil kunne ændre det, mener forsker.

AF KIRSTEN NILSSON

BARSELSFOND · Kvinder er en potentiel udgift for arbejdsgiveren, fordi der er en risiko for, at de går på barsel. Det er ifølge Ingeniørforeningen i Danmark (IDA) hovedårsagen til,

at nye tal viser, at kvindelige ingeniører har 30,7 procent større risiko for at blive ledige end mandlige.

»Økonomisk set er kvinder uattraktiv arbejdskraft, primært fordi det er dem, som tager barselsorloven. Og med den forlængede orlov skal

arbejdsgiveren undvære moderen et helt år,« siger Mia Bacher Olsen, formand for IDA's Kvindeudvalg.

IDA kræver derfor en barselsfond, som udligner arbejdsgiverens udgifter til barsel ved at alle betaler til fonden, uanset om de har kvinder

ansat. Foreningen forestiller sig samme model som ATP'en, hvor arbejdstager og arbejdsgiver deler udgiften.

Og at en barselsfond er en god idé, er forsker Helena Skyt Nielsen enig i.

»En barselsfond ville dele udgiften til orloven mellem moderen og faren,

rens arbejdsplads,« siger Helena Skyt Nielsen, der er lektor på Aarhus Universitet, og som i en undersøgelse har dokumenteret, at nyuddannede kvinder oftere er ledige. Hun mener, at en barselsfond

skal sikre, at mændene får løn under barsel i længere tid end i dag og dermed skabe forudsætningerne for, at fædre tager en større del af orloven.

»Det vil gøre det lige så ufordelagtigt at ansætte en mand som en kvinde,« siger hun.

Spørgsmålet om en barselsfond er et af kravene ved de overenskomsterforhandlinger på det private arbejdsmarked, som er i gang netop i disse dage.

▲ 8

IUPAP conference on Women in Physics, Rio de Janeiro, Brazil, 2005

Julia Yeomans¹, Deda Antoneta², Gillian Gehring³, Raji Heyrovská⁴, and Larissa Svirina⁵.

¹ University of Oxford, UK,

² University of Tirana, Albania,

³ University of Sheffield, UK,

⁴ Academy of Sciences of the Czech Republic, Prague, Czech Republic,

⁵ National Academy of Sciences of Belarus, Minsk, Belarus.

Imagine a physics conference with 143 participants almost all of whom are female. Most of the women in Rio enjoyed the novel experience of belonging to a majority rather than a minority. (Would our male colleagues enjoy being the only man at a meeting of 100 physicists?). This was the Second IUPAP meeting on Women in Physics, the Brazilian team made the visit to Rio enjoyable for all the participants. Details are on the conference web site www.cbpf.br/~women-physics/ and a full report will be published by the AIP.

The conference aim was to find ways of increasing the representation of women within the profession. Attracting and retaining women in science is now recognized internationally as a priority to boost the numbers of trained scientists and hence grow the "knowledge economy". The EU now has policies for the removal of gender inequalities as a requirement for participation in many of its programmes. Moreover those of us that have enjoyed a fruitful and rewarding career as a physicist are distressed to see girls and young women put off by incorrect perceptions that it is a boring and irrelevant preserve of the uncommunicative male.

The participants came from forty two countries of which sixteen are members of the EPS. The society thought that EPS representation was sufficiently important to provide some contribution for travel funds for three of the participants. It is clear that female participation in Physics varies enormously among EPS countries so this is an area where we can learn from each other. There were two poster sessions: one on gender issues and the second on the scientific research of the delegates.

The conference assessed the progress that has been made in recruiting, retaining and promoting women physicists worldwide since the first meeting in 2002. Both exciting and sobering international differences came to the fore. We heard talks from representatives from the USA that is at the forefront of collecting data about, and running initiatives to encourage, women physicists. These include workshops on writing grants, peer-mentoring and site visits to encourage women-friendly practice.

It was interesting that an AMP report on "Women in Physics and Astronomy 2005" which was presented at the meeting cast doubt on the idea of the "leaky pipeline". The figures, for the USA, suggested that the paucity of women in senior positions is not because of them dropping out at every career step, but just a natural consequence of the small number of women taking graduate degrees thirty years ago. Together with growing activity of women physicists, this sends a hopeful signal for the future.

10.



Attendees at the IUPAP Women in Physics Conference 2005

There was also a large delegation from the UK where there have been several initiatives since the First IUPAP meeting on Women in Physics held in Paris three years ago. Ann Marks, the chair of the Women in Physics Group summarised these including email networks, career break support and also the 'Lab on a Lorry', a mobile venue from which to advertise the delights of physics. One disappointment was that, apart from the UK, there were very few representatives from Western Europe although there were several delegates from Eastern European countries. There was also little discussion of women physicists working in industry and we hope that this will be high on the agenda for future meetings.

The situations in the USA and Western Europe were in stark contrast to that described by women from less developed nations. The 2005 L'Oreal-UNESCO Award Laureate for Africa, Professor Zohra Ben Lakhdar, decided to go back to Tunisia, after studying in France, to found a new research group. It took 20 years of patience and perseverance to get the group's research - on atomic physics with applications to environment and agriculture, medicine and industry - up and running. Just obtaining a spectrometer and computers proved major hurdles. Professor Ben Lakhdar's group's current objective is to become a "Pole of Excellence", acting as a bridge between European and African research.

A view from China was presented by Ling-An Wu from the Chinese Academy of Sciences. In China the standard retirement age for women is 55 (compared to 60 for men) and they can only continue to do research if they have achieved the status of full professor. Many excellent women, with the additional family responsibilities they bear, do not make this rung on the promotion ladder in time and are therefore forced to retire. Interacting with women physicists from across the globe enabled us to start to understand the problems faced in different cultures and to progress with finding solutions.

The discussion groups were one of the most useful parts of the conference. The topics were: Attracting Girls into Physics; Launching a Successful Physics Career; Getting Women into the Physics Leadership; Structure Nationally and Internationally; Improving the Institutional Climate for Women in Physics; Learning from Regional Differences; Balancing Family and Career. Reports of the group discussions will also appear in the AIP Proceedings.

Brazil is a long way from Europe and so it was difficult for many Europeans to attend. Therefore it is important to record the resolutions here. They are directed to the IUPAP General Assembly and are relevant to us all - but the third one is especially relevant to the EPS because of its role as a conference organizer.

1. Assign to the IUPAP Liaison Committees the important role in their countries of catalyzing women's participation in physics and reporting on progress.

2. Strongly encourage the physical societies in its member countries to share information and resources with physicists who are isolated.
3. Require organizers of the conferences it sponsors to improve their inclusion and encouragement of women, and request its member societies and other scientific unions to do the same. Provide child care facilities for delegates with children.
4. Model exemplary institutional transparency in its policies, procedures, practices, and activities and increase the presence of women among its leadership.
5. Co-sponsor the development and encourage the use and translation of training modules on gender and race equity in physics, on physics education pedagogies and curricula, and on the recruitment, retention, and advancement of women.
6. Request the IUPAP Working Group on Women in Physics to oversee a thorough international survey of the status of women in physics in 2007, organize the 3rd International Conference on Women in Physics in 2008, and report at the 26th IUPAP General Assembly in Fall 2008.

As the world is facing a time when more technology is needed to combat problems of climate change and inequality it is important to use all the intelligence available. Increasing the participation of women is an idea whose time has come! ■

Condensed matter festival in Dresden

November 15th is the abstract deadline for the 21st General Conference of the EPS Condensed Matter Division, with the conference due to start on 26 March 2006 in Dresden. The meeting is organised jointly with the annual DPG Solid State Physics Spring meeting, with the combined conference providing an excellent opportunity for meeting with and presenting work to a wide international audience.

The CMD General Conference is one of the largest and longest established EPS meetings. The Conference is usually held in conjunction with a national condensed matter meeting, with recent meetings attracting large attendances to Prague (2004), Brighton (2002) and Montreux (2000). Next year's meeting promises to be the largest ever European condensed matter meeting, with an expected attendance of about 5,000 delegates to Dresden.

Because the EPS Conference gives an additional international dimension, the DPG meeting will for the first time be held entirely in English, from abstract submission through to oral and poster presentations. The conference highlights the overall strength of the condensed matter community, with symposia and plenary talks devoted not only to subject areas such as magnetism and semiconductors but also to nanosciences and areas where condensed matter plays an increasing role, including strong sessions on biological physics and even physics of socio-economic systems.

Dresden will provide a particularly attractive and lively location for the meeting. The city of Dresden celebrates its 800th anniversary in 2006. Many important historical buildings, including its famous castle, have recently been reconstructed and many cultural highlights are planned in Dresden to mark the anniversary. The meeting offers an ideal opportunity for young researchers to meet with and present their work to a wide international audience. For more information, including registration details, see www.cmd21.org. ■

Gender Equality



Do women count?

- 🌐 **The under representation of women at higher academic levels is a fact all over the World today and is recognised as both an important democratic and economic issue by the leaders of our society.**
- 🌐 **The background is a phenomenon called “the leaky pipeline” that describes the gradual loss of women from science throughout their career path, even though women and men go into higher education in equal numbers.**
- 🌐 **A common explanation is that women “choose not to pursue a career”, however, this does not explain why women who do choose a career, statistically have a lesser chance to advance when compared to men in the same positions.**

So what can WP3 offer you?

- **If you are a senior scientist (male or female) in N2L who wish to get more insight into, and practical exercises on, how different leadership styles and group dynamics can affect results, you can participate in the Human Resource Management Course - PROGRESS**
- **If you are a PhD student, postdoc or untenured faculty member in N2L (male or female), pursuing an academic career, you can have a mentor** - this is your opportunity to get encouragement, advice, and access to networks of tenured faculty members or other senior professionals from industry in your field, but from outside your current institution.
- **If you are a tenured faculty member or professional in industry you have the opportunity to share your experiences by becoming a mentor** - this is your opportunity to make a difference in the life of a student, postdoc etc,
- **If you have ideas of NanoBio research with a gender perspective** - an example could be drug delivery systems via nanoparticles that enable to consider gender differences in dermal drug up-take - **then there is a Pan-European expert group that would be interested in your ideas and suggestions**

Upcoming events and contact details

- 🗨 **PROGRESS** will next take place; **Nov. 7-11; Nov. 14-18; Nov. 21-25; and Dec. 12-16 2005.** For details about course and place, see <http://www.education.lu.se/o.o.i.s/3493>;
Contact: Cecilia Agrell (cecilia.agrell@education.lu.se) or **Jenny Emnéus** (jenny.emneus@analykem.lu.se)
- 🗨 **Mentoringprogram** will start **January 2006.**
Contact: Elena Martinez (emartinez@pcb.ub.es), **Cecilia Agrell** or **Jenny Emnéus**
- 🗨 Final formation of the **Pan-European expert group** in Nov.-Dec. 2005
Contact: Petra Zalud (Zalud@tp21.de) or **Matthias Mallmann** (m.mallmann@nanobionet.de)

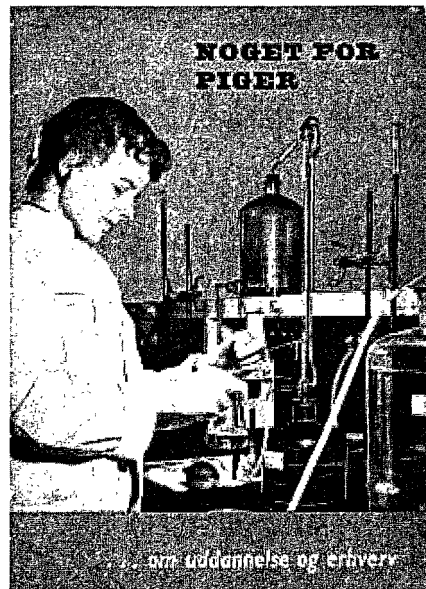


Køn og kultur i fysik

I Danmark bliver fysik betragtet som et regulært mandefag med forsvindende få kvinder. I Italien er der imidlertid masser af kvinder i fysik. Hvad skyldes forskellene? I dette forskerinterview løfter antropolog Cathrine Hasse lidt på vores fastlåste kulturelle forestillinger

Af Anne-Mette Klausen

FORUM/16.10.2003 I Danmark er fysik ikke et fag for kvinder. Det er tilsyneladende helt uden afsmittende virkning, at det var en kvindelig fysiker, Marie Curie, der opdagede de radioaktive grundstoffer, og som den første nogensinde blev tildelt to Nobelpriser inden hendes død i 1934. I Sydeuropa ser det anderledes godt ud for kvindelige fysikere. Tager man et Europakort og sætter en lille, hvid knappenål for hver kvindelig fysiker i landene, vil et stadigt mere snehvidt landskab åbenbare sig jo sydligere, vi kommer. Vender man sig 90 grader mod øst, ligner det overvejende muslimske land Malaysia noget nær indlandsisen på Grønland: masser af kvindelige fysikere.



Pjece udgivet af Danske Kvinders Nationalraad, 1956.

Danmark derimod huser under 5 % kvindelige lektorer i fysik. Her i landet betragtes fysik som et fag for mænd, og mange af de kvinder, der vover sig ind på studiet, dropper ud igen. Hvorfor? Det satte antropolog og journalist Cathrine Hasse sig for at undersøge i sin ph.d. *Kraftfeltet – kulturelle læreprocesser i det fysiske rum*. Hendes feltarbejde bestod bl.a. i, at hun sammen med 119 førsteårsstuderende – 22 kvinder og 97 mænd - indskrev sig på Niels Bohr Institutet, hvor hun fulgte studiet og eleverne. To år efter var 7 af kvinderne tilbage og 47 af mændene. Af årgangen valgte Cathrine Hasse at følge 37 af eleverne ganske tæt.

Kun én ud af de ni kvinder, Hasse fulgte tæt fra kursusstart, har valgt at forsøge sig med en kandidatgrad, skønt alle kvinderne startede med den "fysiske" selvtillid i top. Til sammenligning har to af mændene taget deres kandidatgrad, mens 17 af mændene stadig er indskrevet og må formodes at sigte mod en kandidatgrad.

For at skære ganske unuanceret, men rent ind til benet var en af Hasses konklusioner, at fysik betragtes som et maskulint fagligt felt i Danmark – et maskulint rum, hvor kvinder "sluses" ud undervejs.

Nu har Cathrine Hasse netop indrettet sig i sit nye kontor på Danmarks Pædagogiske Universitet, hvor hun er tiltrådt som lektor og er i gang med forskningsprojektet "Videnskabens kulturelle dimensioner". Emnet er beslægtet med hendes ph.d., som hun bruger som del af sin research. Men denne gang sammenligner hun Danmarks og Italiens vidt forskellige tilgang til fysik såvel som til de uddannede kvindelige fysikere. Ikke mindst er det primære fokus at anskue forskellene landene imellem med en kulturanalytisk optik. Ikke kultur forstået som noget naturligt, iboende, men som konstruktion og proces. Den optik gør det muligt at se vore egne selvfølgelige forståelser af verden som de kulturelle konstruktioner, de er. Den sammenlignende forskning kan sætte disse

konstruktioner endnu stærkere i relief, som når Hasse sammenligner kvindelige fysikere i Danmark med kvindelige fysikere i Italien.

Som Hasse i sin ph.d. påviste, bliver fysik i Danmark betragtet som et maskulint rum, men, som nævnt, jo sydligere vi bevæger os jo flere kvindelige fysikere. I Italien er det et selvfølgeligt job for en kvinde at være fysiker. Og i samme åndedrag nævner Cathrine Hasse Malaysia som et lidt overraskende bud på en nation, der har en enorm andel af kvindelige fysikere.

At sammenligne talmateriale fra Danmark og Italien skal tages med et gran salt, forklarer Hasse. Fx kan de to landes uddannelsessystemer ikke helt sidestilles, bl.a. fordi Italien har langt flere adgangsgivende uddannelser til fysikstudiet. Der er dog ingen tvivl om tendensens klarhed. I sit igangværende forskningsprojekt har Cathrine Hasse flyttet vægten fra de studerende i ph.d.'en til nu primært de ansatte fysikere, og her har Italien 34 % kvindelige ansatte fysikere, mens Danmark har under 5 %.

Cathrine Hasse er halvvejs henne i sit forskningsprojekt, som i parentes bemærket ikke som sådan skal forveksles med en forskningsmæssig agitation for flere kvinder i dansk fysik: "Se hvor de kan i Italien. Det burde vi også gøre i Danmark!".

- Forholdet mellem konstruktioner af køn og kultur er dybt komplekst. Det vigtigste at se på er måske slet ikke køn, men kulturelle forståelser af fysikfaget. Jeg er ikke kønsforsker. Kønsforskning er en del af min forskning, men ikke mit emne, og den kønspolitiske tilgang, hvor udgangspunkter er faste køns kategorier, er slet ikke det, der optager mig.

- I stedet er jeg meget mere optaget af det, man kalder **blending**, altså det modsatte af den meget kategoriske måde at tænke på. Vi har alle mere eller mindre en meget compartmentaliseret (opdelt, red.) tilgang til verden og forstår den i afgrænsede og begrænsende bokse og båse, men det er jo ikke sådan, mennesker i virkeligheden lever deres liv.

Cathrine Hasse er nu i fuld gang med at sætte flere forskningsresultater bag ordene med udgangspunkt i det tilsyneladende afseksualiserede, kønsløse og kulturrensede fagområde, fysik.

- Man kan jo starte helt fra bunden fx med kategorien "Kvinde" - hvad er en kvinde, som Simone de Beauvoir spurgte. Hvordan opfatter man det at være kvinde, og så omsætter jeg det så til, hvordan opfatter man det at være kvindelig fysiker. Og jeg ser det som en fordel, at området ikke i forvejen er inficeret af en masse forudindtagne holdninger om køn og kultur. Fysik udgør på den måde en perfekt mikroskopisk verden for at anskueliggøre nogle af de kulturelle forskelle, der ellers let i andre sammenhænge, ville forsvinde i mængden af forskellige kønsdiskussioner og identitetspolitikker, siger Cathrine Hasse.

Hun valgte fysik primært, fordi hun hos den akademiske organisation, "Køn i Akademia" fandt ph.d. midler. Men medvirkende til beslutningen var også, at hun som humaniorauddannet antropolog var ret så nysgerrig efter at finde ud, hvad forskellen er på det, man kalder en rigtig eksakt videnskab og den videnskab, hun som antropolog udøver, og om det egentlig kan være så svært at forstå noget af fysikvidenskaben.

- Det var det på nogle måder ikke – selv humanister kan godt finde ud af det – og det kan kvindelige humanister også", som hun ironisk tilføjer. Og nu vi er ved valgene, blev det Italien af mulige lande af den pragmatiske grund, at Cathrine Hasse taler italiensk.

Hasses italienske feltarbejde er foregået på universiteterne La Sapienza i Rom og Catania Lecce i

det sydlige Italien. Her har hun fulgt arbejdet, delt kontor med en ansat fysiker, deltaget i ganglivet, været på laboratorierne og delt frustrationerne, når computerne brød ned - kort sagt været en del af arbejdspladsen. Herhjemme er feltarbejdet dels hendes ph.d. fra Niels Bohr Institutet og dels masser af interviews med mennesker i den danske fysikerverden.

- *Hvad er det, der gør, at man i Italien har langt flere kvindelige ansatte fysikere end i Danmark?*

- Der er flere forklaringer. Optagelseskravene til studiet er anderledes i Italien. Du kan stort set komme ind fra gaden, blot du har en uddannelse på gymnasialt niveau. Og du behøver ikke have en naturvidenskabelig baggrund, men kan komme ind på studiet med en klassisk-sproglig baggrund - uden supplerende fag eller kurser vel at mærke! Af de italienske fysikstuderende udgør kvinderne 43,9 % - til sammenligning er det 18 % i Danmark. **Af de italienske kvinder kommer over en tredjedel ind med en sproglig eller klassisk-sproglig uddannelse i bagagen, og det betragtes tilmed som et plus. På naturvidenskab lærer man stringente, retlinede metoder, regneregler osv. Det er således en mekanisk måde, man er vant til at indtage læring på. Hvorimod man som klassisk-sproglig er vant til at tænke abstrakt. Fra grammatikken er man også vant til systemtænkning, og så har man jo hele filosofien med sig fra Platon, Sokrates til Cicero osv. Det giver en helt anderledes måde at gå til faget på, og som kvinder er gode til. Kun 5.8 % af mændene kommer fra de sproglige fag.**

- En anden forklaring er muligvis den, at den italienske kvindelige fysiker er en del af et familienetværk og opfattes som sådan primært. Typisk sidder hendes mand eller bror på kontoret over for eller hendes far nede for enden ad gangen. Jeg ved endnu ikke, hvordan familierelationen kan bruges som argument i denne forbindelse, men jeg kan konstatere, at familienetværket er meget udbredt indenfor fysik. Min klare fornemmelse er, at det giver et godt arbejdsklima. Det er svært at svare konkret på, men det er naturligvis kulturhistoriske strømninger, der spiller ind. Historisk set har der været flere kvinder i naturvidenskaben i Sydeuropa, og her tænker jeg ikke kun på Marie Curie. Vi kan gå helt tilbage til 17-1800-tallet og finde kvinder, der har beskæftiget sig med astronomi og andre naturvidenskabelige felter. Et eksempel er astronomen, Laura Bassi, der underviste ved Universitet i Bologna og i øvrigt fik 12 børn!

- *Og hvorfor så få kvinder i fysik i Danmark?*

- Optagelseskravene har igen en hel del med det at gøre. I Danmark er adgangsbilletten til fysikstudiet en naturvidenskabelig baggrund, men så kan du til gengæld også komme ind med et 6-tal! Man kan godt komme ind med en sproglig studentereksamen, men så kræver det supplerende fag, for at nå på højde med de andre studerende...

- Samtidig er det jo så sådan, at selve studiemiljøet i den grad er maskulint, og kvinder har svært ved at passe ind i denne specielle, maskuline, naturvidenskabelige selvforståelse. Fra mine mange interviews i fysik- og fysikrelaterede miljøer rundt omkring i Danmark fremgår det også, at den kvindelige fysiker kan blive udsat for sexchikane. Jeg har bl.a. selv oplevet, at en kvindelig studerende havde en kort nederdel på og at en mandlig studerende stak et kamera ind under kjolen og tog et billede. Der er chikanerier i Danmark, som tilsyneladende ikke ses i Italien, men det kan ikke fastslås hvorfor. Forklaringen kan jo være, at den italienske kvindelige fysiker primært ses som en del af et familienetværk. Hun er dermed beskyttet. Det er svært at udsætte en kvindelig kollega for chikaneri, når hendes mand eller far sidder på kontoret overfor. Generer man hende, generer man samtidig hendes familie. Det er vanskeligt at få et fuldstændigt billede af, hvordan det helt konkret forholder sig. Jeg spurgte naturligvis til emnet i Italien, men intet tydede på, at sexismen fandt sted.

Dog kan det godt være, at man i Italien simpelthen ikke taler om den slags. At sexchikanerier foregår mindre offentligt og er sværere overhovedet at omtale selv på tomandshånd end det, jeg oplever i Danmark. Det kan ikke udelukkes.

Cathrine Hasse vil nødtigt med de graverende chikanehistorier hun har lagt øre til i Danmark hænge hverken institutter eller interviewede ud, men siger med fast stemme: - ud fra hvad jeg har fået fortalt og selv oplevet, må man sige, at chikanerier på grund af køn finder sted inden for fysik i Danmark. I Italien oplevede jeg til gengæld noget, jeg ikke har set på danske fysikinstitutter – unge par, der helt åbenlyst lå og kyssede hinanden på bænke i gangene i pauserne mellem timerne. Det skyldes formentlig igen familieforholdene, hvor de unge, der bor hjemme, føler sig henvist til det offentlige rum, når de skal kysse med kæresten.

- Hvorfor er det, at man i Danmark forbinder naturvidenskab, herunder fysik, med et maskulint fagområde?

- Der findes forskellige teorier. Man har forbundet naturvidenskaben med raketter, store eksplosioner og den slags, og her har man set en naturlig forbindelse til mænd. Kvindelige forskere på området har før været inde på, at man har opfattet kvinden som naturen, som manden skulle fravriste sine hemmeligheder. Kvinden/naturen skulle udforskes, kortlægges og forklares. Kvinden har altid været koblet til natur, og når man selv er natur, hvordan skal man så kunne undersøge sig selv?

- Og så er der teorien om, at kvinden fra naturens side simpelthen ikke evner at tænke komplekst, og her kan man jo så passende spørge, om de malaysiske kvinder er "mindre kvinder" end andre kvinder? Det passer mig fint her at kunne give et spark til hele den biologiske diskussion, der kører. Så skulle det altså være noget med, at kvinder i Malaysia og Italien er anderledes genetisk sammensat end fx kvinder i Danmark?

Men Italien er altså virkelig fremme i skoene, langt ude over alle de evindelige kønsbarrierer, der stadig spænder ben for os ellers så sindssygt ligestillede nordboere et godt stykke nord for München, eller hvad? Næh, ikke just, mener Cathrine Hasse.

- Fordi flere italienske kvinder bliver fysikere end danske, og fordi mange italienske kvinder fravælger at få børn, er det bestemt ikke ensbetydende med, at de er mere ligestillede end danske kvinder. Igen er det noget med at se mellem kategorierne og de fastlåste forestillinger. Det ene udelukker ikke det andet.

- Kvinder og mænd i Italien er ikke ligestillede. Billedet er langt mere nuanceret end som så. Det er stadig kvindernes ansvar at passe børnene. Kvinderne skal på den måde arbejde langt mere end mændene, hvilket gør det meget svært at konkurrere med mændene. Vil man gøre karriere, skal man kalkulere med mange rejser og sene nætter, og her spiller familien og især bedstemødrene en enorm rolle. En fysiker, jeg interviewede, fortalte mig, at hun havde været ude at rejse i arbejdsøjemed, og hun synes, at det var så fint, at hendes mand så imens tog hjem til hendes mor - og børnene og spiste dér, mens hun var væk. Børnene bor simpelthen ikke hjemme hos deres far, når mor er på rejse - de bor hos bedstemoren. Det er bestemt ikke lykkeland! Og at italienske kvinder i højere og højere grad vælger børn fra, kan meget vel skyldes, at det i Italien er sværere at forestille sig kvinder med børn gøre karriere. Der er måske reelt ikke et både og. Og slet ikke hvis man er enlig mor.

- Hvad kan vi i Danmark gøre for at få flere kvinder til at vælge fysik som fag og rent faktisk blive færdiguddannede fysikere?

- Vi - og det gælder selvfølgelig ikke mindst beslutningstagerne på området - skal i højere grad være bevidste om, at det vi ser og oplever, er kulturelle indlejringer. Ting kan ses på flere måder, og her er det vigtigt at gøre op med den meget kategoriske måde at tænke tingene på, men derimod tænke mere i *blending*, om du vil. Din egen måde at se og opfatte tingene på, er ikke den eneste måde, at se verden på. Jeg håber da, at min forskning kan medvirke til, at man i højere grad åbner op for, hvad der befinder sig mellem alle de kategoriske bokse, vi sætter op, og at det kan medvirke til at nedbryde de fasttømrede skranker, der f.eks. er mellem humaniora og naturvidenskab og kvinder og mænd.

Efter den nye lovgivning på uddannelsesområdet får de forskellige fag tildelt økonomiske midler, som de har studerende til, så hvem er derfor ikke interesseret i at tiltrække så mange studerende som muligt – mænd som kvinder.

- Danmarks humanistiske uddannelser har jo ingen problemer her, men det er en hård nyser for de naturvidenskabelige fakulteter. Fysikstudiet er meget interesseret i at tiltrække flere kvindelige studerende til faget, også fordi det jo kan sikre den økonomiske overlevelse. Og man ser det som et problem, "fordi kvinder jo pr. definition ikke er interesseret i et fag som fysik". Og her støder vi så igen på den fastlåste og begrænsende tankemåde, for interessen for faget fejler altså ikke noget hos kvinder i mange andre lande - fx i Italien. Det her drejer sig om kultur – vi må væk fra den essentielle tankemåde, der fx siger, at "Hassan er sådan, fordi han er tyrker, og tyrkere er sådan!"

- Kultur er de erfaringer og nye erkendelser, vi gør os, når vi møder en anden virkelighed, end den vi troede var den eneste. Naturligvis er vi nødt til i en vis grad at skabe kategorier for at få nogenlunde styr på tingene, men vi skal ikke lade os låse fast i dem og lade dem spærre for nuancerne og nye erkendelser. Disse kan bringe os videre og hjælpe os til at se verden i et bredere og mere åbent perspektiv. Virkelighedens verden er en blandet og blended affære – selv inden for et område som fysik.

Anne-Mette Klausen er freelance-journalist og skriver regelmæssigt for FORUM

Fysik er da et kvindefag

I Italien er næsten hver anden fysikstuderende kvinde. Synet på faget er anderledes og optagelseskravene mindre ensporede end i Danmark

KVINDEFYSIK

af Kristian Villesen

Fysik er ikke ligefrem et mo-
defag blandt danske kvinder.
Faktisk er udgør kvinder kun
omkring 20 procent af de
danske fysikstuderende. I
Italien forholder det sig imid-
lertid anderledes. Her er
næsten halvdelen (45 pro-
cent) af de fysikstuderende
kvinder. Det viser en ny
undersøgelse, som er foreta-
get af Danmarks Pædago-
giske Universitet.

Og det er ikke tilfældigt, at
det forholder sig sådan, me-
ner Lektor Cathrine Hasse,
som står bag undersøgelsen. I
Danmark har vi nemlig en op-
fattelse af, at fysik og naturvi-
denskab generelt er maskuli-
ne fag:

»I Danmark opfatter vi na-
turvidenskaben og specielt
fysikken som hårdt og util-
gængeligt. Vi har en forestil-
ling om, at fysik er et meget
hardcore fag. Også blandt de
studerende,« siger Cathrine
Hasse, som blandt andet har
fulgt de studerende på Niels
Bohr Institut.

Hverdag

I Sydeuropa er synet på na-
turvidenskaben imidlertid
en ganske anden. Her betrag-
tes faget hverken som spe-
cielt maskulint eller hardco-
re.

Cathrine Hasse har under-
søgt det italienske fysikstu-
dium:

»Når jeg spurgte de
kvindelige studerende, om
ikke de læste et maskulint
fag, kiggede de overraskede
på mig. De opfattede det ikke
som en hård videnskab – og
slet ikke som noget masku-
lint,« fortæller Cathrine Has-

se. I Italien har man en mere
hverdagsforankret opfattelse
af fysikken:

»Jeg har f.eks. set fysikere,
der var kaldt i studiet til fod-
boldkampe, så de kunne kom-
mentere, hvordan bolden
skruer på sin vej til nettet. I
Danmark er fysikken ikke på
samme måde knyttet til hver-
dagslivet,« siger Cathrine
Hasse.

Institutleder på Niels
Bohr Institut, John Renner
Hansen, kan godt genkende
billedet af fysik som et sær-
ligt maskulint og hardcore
studium:

»Jeg tror, det er rigtigt, at
vi i Nordeuropa betragter fy-
sik som et meget teknologisk
fag, mens man i Sydeuropa
mere ser det som et kultur-
fag,« siger John Renner Han-
sen.

Sproglige fysikstuderende

I Italien kan sproglige stu-
denter læse fysik på universi-
tetet. Det er muligvis med til
at give faget et blødere image
– og tilmed kan de sproglige
tilbage bidrage til faget:

»En tredjedel af de
kvindelige italienske fysik-
studerende er klassisk sprog-
lige studenter. Men det opfat-
ter man kun som en fordel,«
siger Cathrine Hasse.

Hun opfordrer derfor til,
at vi i Danmark kigger nær-
mere på de strenge krav til
optagelse på de videregåen-
de naturvidenskabelige ud-
dannelser:

»Vi lægger meget vægt på
at de, der kommer ind, skal
have en solid faglig ballast.
Det er så okay at komme ind
med et 6-tal på A-niveau, men
ikke med en sproglig bag-
grund,« siger Cathrine Has-
se.

Og de strenge optagelses-
krav er stik imod politikernes
egne ønsker:

»Vi har en intention om at
have mange kvinder, der læ-
ser fysik og de øvrige naturvi-
denskabelige uddannelser.
Men over halvdelen af de

kvindelige studenter har slet
ikke de adgangsgivende ni-
veauer,« siger hun.

Løsning

Også hele den danske opfat-
telse af de naturvidenskabeli-
ge fag kan tages op til overvej-
else.

»Det handler ikke bare
om, hvad kvinder kan, men
også om, hvad fysik er. Den
opfattelse er kulturelt beto-
net, og så er det også muligt at
tænke det anderledes,« siger
Cathrine Hasse og tilføjer:

»Forskningen viser, at det
kan lade sig gøre at være
kvinde og fysiker med en
klassisk sproglig baggrund.«

Institutleder John Renner
Hansen er enig i, at opfat-
telsen af naturvidenskaben
kan ændres:

»Det er ikke bare på uni-
versiteterne, men allerede i
gymnasiet og folkeskolen,
man skal sætte inde for at gø-
re fysikken og naturviden-
skaben til et kulturbærende
fag,« siger John Renner Han-
sen. Han er dog ikke meget
for at optage sproglige stu-
denter, ligesom man gør i Ita-
lien:

»Jeg står ikke hårdt på,
hvad folk skal kunne for at
komme ind. Det må vi indret-
te os efter. Men om vi lige-
frem skal optage sproglige,
ved jeg ikke.«

Et oplagt spørgsmål er, om
italienerne med deres min-
dre hardcore hverdagshold-
ning til faget er lige så gode til
fysik, som vi er i Danmark.
Det mener Cathrine Hasse, at
de er:

»I PISA-undersøgelserne
ligger Danmark og Italien på
samme niveau, men det er
selvfølgelig i grundskolen.
Men det handler igen også
om kulturforståelsen. Hvis
flere kvinder får noget ud af
det, så må de være dårligere.
Men det kan man ikke slutte,«
siger Cathrine Hasse.

krv@information.dk

Politiken 6/9 2005

Kvinder og andre chefer

Kønsdiskrimination

Af Peter Valenius,
amtsrådsmedlem (S)

»BANEDANMARK har selv vurderet fejlen som så grov, at de allerede har fyret den kvindelige chef og frtaget næstkommenderende for ledelsesansvar«, stod der i en artikel på forsiden af Politiken forleden.

Næstkommenderende er åbenbart blot en mand, for ellers ville vedkommende med garanti også have fået påklaret en kønsmærkat. Ville man også have fundet den modsatte tekst, hvis det havde været tilfældet:

»Banedanmark har selv vurderet fejlen som så grov, at de allerede har fyret den mandlige chef og frtaget næstkommenderende for ledelsesansvar«.

Svaret er enkelt – nej.

Eksemplet er ikke enestående. Læser man aviserne lidt mere grundigt, sker det gang på gang, at der i virkeligheden kønsdiskrimineres, så det klodser. Det gælder også i Politiken.

Styrelsens kvindelige direktør var ikke at træffe for en kommentar, hed det i en tilfældig artikel om Udlændingestyrelsen. Eller en kvindelig sagsbehandler i Udlændingestyrelsen er blevet fængslet mistænkt for osv., var en anden variant.

Der havde næppe stået styrelsens mandlige direktør eller den mandlige sagsbehandler, hvis de nu lige havde været mænd.

DET SAMME gør sig gældende på en række andre områder. Studieværter er selvfølgelig mænd, mens kvindelige studieværter er noget ganske andet. Den kvindelige politibetjent greb resolut ind – som om det også var så overraskende. Politibetjenten havde nok gjort det samme, men her behøver man ikke understrege, at han er en mand i den situation.

Eller tænk blot på 'de kvindelige ministre' og 'den kvindelige borgmester'. Der hedder aldrig 'de mandlige ministre' eller 'den mandlige borgmester' i medierne, for sådan nogen er jo nærmest per definition mænd – eller hvad? Den mandlige politiker eksisterer ikke, han er jo bare politiker.

Politiken burde gå forrest og rense ud i sin sprogbrug. Der er på tide, at vi kommer lidt længere ligestillingsmæssigt.

Is Science Education Relevant?

Henrik Busch,
Department of Curriculum Research, The Danish University of Education, Copenhagen.

In this article a range of results from the ROSE-project (Schreiner & Sjøberg, 2004, 2005) are reported with particular focus on the question of whether science education is relevant to 15-year olds in three OECD countries: Japan, England and Denmark. Based on an analysis of the available data, four dimensions of science and science class relevance are investigated. These dimensions will be referred to as the *Everyday life dimension*, the *Future- and career dimension*, the *Science, technology and society dimension* and finally the *Science class content dimension*. Finally the results are discussed in a broader perspective.

Science education in Europe at all levels is facing significant challenges. Firstly; it is often argued that all citizens must be scientifically literate in order to participate competently in a modern knowledge-based society where science and technology have major impact on everybody's life. On a daily basis, we all face debates in media and in the political arena about socioscientific controversies such as global climate change, the use of gene manipulated organisms in food products and cloning of human beings (Kolstø, 2001). The need for a broadly based and competent participation in decision making concerning these issues demands of the educational system that science be taught in ways which make it interesting and relevant to all students (Andersen et al., 2003; Millar & Osborne, 1998). Secondly, there is concern that European countries will find it increasingly more difficult to meet the need for a knowledge- and technology-based society to produce a high proportion of trained citizens capable of conducting research, development and education within science and technology (The High Level Group on Increasing Humans Resources for Science and Technology in Europe, 2004).

In order for European educational systems to meet these challenges science educators and scientists need a qualitatively deeper and more solid evidence-based understanding of young peoples' attitudes towards science, technology and school science. Hence the ROSE-project and this article.

The ROSE-project

The ROSE-project is an international comparative study led by Professor Svein Sjøberg along with Ph.D.-student Camilla Schreiner from the University of Oslo in collaboration with science education researchers from 40 other countries representing all continents except North America. In each country a geographically and socio-economically representative sample of 15-year old students' has filled out the ROSE-questionnaire, which consists of 250 statements (items) to which the students were asked to respond on a four-point Likert scale (see below). The complete international data set is not yet fully released, but for the purpose of the present article permission has been granted to publish some international results.

1 Cf. (Schreiner & Sjøberg, 2004) for the sampling procedures.

Item	Statement	Mean			Mean difference		Country
		Girls	Boys	All	G-B		
F07	The things that I learn in science at school will be helpful in my everyday life	2.50	2.70	2.60	-0.20	Sig.	Japan
		2.71	2.68	2.68	0.03		England
		2.35	2.37	2.37	-0.02		Denmark
F09	School science has made me more critical and sceptical	1.78	2.09	1.94	-0.31	Sig.	Japan
		2.15	2.33	2.24	-0.18	Sig.	England
		2.05	2.15	2.10	-0.10		Denmark
F10	School science has increased my curiosity about things we cannot yet explain	2.22	2.67	2.45	-0.45	Sig.	Japan
		2.61	2.79	2.70	-0.18	Sig.	England
		2.32	2.38	2.36	-0.06		Denmark
F11	School science has increased my appreciation of nature	2.62	2.57	2.59	0.05		Japan
		2.26	2.33	2.30	-0.07		England
		2.33	2.24	2.29	0.09		Denmark
F13	School science has taught me how to take better care of my health	1.96	2.18	2.07	-0.22	Sig.	Japan
		2.68	2.60	2.64	0.08		England
		2.34	2.24	2.30	0.10		Denmark

Table 1: Student mean scores and gender differences for the five items defining the analytical dimension "Everyday life relevance of science classes"

International comparative studies represent a prominent trend in modern educational research. Within the field of science education, the TIMSS-studies (Trends in Mathematics and Science Studies) and lately the OECD PISA-studies (Programme for International Student Assessment) are the most elaborate, important and influential in terms of impact on educational policy. Broadly speaking, the aim of TIMSS is to assess to what extent (lower secondary school) students have achieved certain curricular goals within mathematics and science, whereas the PISA-studies attempt to obtain a measure of how well 15-years olds are able to handle challenges related to mathematics and science in a modern, complex and knowledge-based society. Both studies focus on *cognitive* factors, however, i.e. students' skills, competencies or level of scientific and mathematical literacy.

In contrast to these studies, the ROSE-project is focused on *affective* factors that influence students' participation in science classes and their current and future engagement in science and technology. ROSE is an acronym for *Relevance Of Science Education* and as indicated by the title, the aim is get insight into the perspective of *learners* on science, technology and science education. In most countries the science curriculum at all educational levels is uniquely defined by the proper authorities: legislative authorities, local boards at educational institutions and the teachers. There are, of course, good reasons for this. Society, the business world and the scientific communities have a range of legitimate interests in students acquiring particular skills and competencies. Until recently, however, we have failed to acknowledge and attempt to map thoroughly the learners' attitudes towards their science classes and towards science and technology in general. At least two reasons to do so can be mentioned. Firstly, we want to teach (science) for citizenship and thus put an emphasis on rational arguments, debate and consensus-making. This can only be done if we also acknowledge the learner's perspective and voice in a particular

teaching situation. Secondly, and more pragmatically, we know that a positive attitude towards the content and the activities in a teaching situation is a fundamental prerequisite for a particular learner's cognitive yield.

A range of studies of students' attitudes towards science using different methodologies have been performed during the last decade or so. A thorough review of these studies can be found in (Osborne, 2003), in which a range of factors known to influence students' attitudes towards science are presented and discussed. It is also pointed out that "the concept of attitude towards science is somewhat nebulous, often poorly articulated and not well understood" (Osborne, 2003). Are we talking about the opinion of the value of science, the motivation or anxiety towards science, the enjoyment of science, etc? Also, which kind of expression of interest or attitude are we dealing with? Is it expressed by a concrete action or a choice which significantly affects the individual's life (such as the choice of study at the tertiary level of education) or is it merely an expression free of responsibility, e.g. in a questionnaire?

In this article the focus will be on different dimensions of relevance of science classes in lower secondary school as seen from the perspective of 15-year olds and expressed as a degree of agreement upon a range of statements featured in the ROSE-questionnaire.

The ROSE questionnaire

The background for the ROSE-study, the objectives, the process of developing the questionnaire and thorough methodological discussions are presented in the background report for the project (Schreiner & Sjøberg, 2004). In the present article a few key elements concerning the questionnaire are presented, whereas the reader is referred to the background document for further details.

The ROSE-questionnaire covers the following sections of items (the number in parenthesis refers to the number of

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questionnaire items belonging to a particular section) in addition to background information about the respondents:

- ACE What I want to learn about (108)
- B My future job (26)
- D Me and the environmental changes (18)
- F My science classes (16)
- G My opinions about science and technology (16)
- H My out-of-school experiences (61)

Examples of items from the questionnaire cover: "Stars, planets and the universe" (in the ACE section), where students must rate the statement on a four-point scale from "Not interested" to "Very interested", "School science is rather easy for me to learn" (in the F-sections), which is rated from "Disagree" to "Agree" and "Visited a science centre or science museum" (H-section) to be rated from "Never" to "Often".

Four dimensions of relevance

"Relevance" is the key word in the ROSE-study. Most dictionaries will tell you that the definition of something being relevant involves being *valuable and useful to people in their lives and work*. However, you have to add the questions "Relevant to whom?" and "Relevant in which contexts?" Both questions are central within the ROSE-framework. The objective of ROSE is thus to investigate *in which sense and in which contexts, science, technology and science education are perceived as valuable and useful to the learners (students) in their lives and work*.

In this article four dimensions of *relevance of science in school* are investigated by analysing student responses from the Japanese, English and Danish samples. The question of students' attitudes towards science is thus for the present purpose narrowed down to being a matter of *how and to what extent science as it is taught in schools might be valuable and useful*. The question is attempted answered by analysing 15-year olds' own ex-

pressions on these matters in the ROSE-questionnaire.

These four analytical dimensions are defined by items in the F-, G- and ACE-sections as follows:

Dimension 1: The 'everyday life' dimension

To what extent is school science valuable and useful to the students in their current everyday life outside school? Five items from the F-section are taken to define this analytic dimension. The statements of these items are presented in table 1. Notice that no specific field (e.g. physics, geosciences, biochemistry...) within science is mentioned in any statements among the F-items. The assumption is that students implicitly will associate the statement with the science-related subjects they are being taught at the time of the filling in of the ROSE-questionnaire.

Dimension 2: The 'future and career' dimension

To what extent is school science valuable and useful to students in terms of preparing for a future career within the field of science and technology and for creating a desire to make a career within this field? The respondents' expressions of agreement to the statements shown in table 2 will be taken as a measure of this dimension.

Dimension 3: The 'science, technology and society' dimension

School science might also be perceived as relevant by students in the sense that they recognize science and technology as important for the development of society and for improving living conditions for human beings. Five items from the G-section constitute this dimension of relevance of school science and are presented in table 3.

Dimension 4: The 'science class content' dimension

It is known from earlier studies that the subject content taught in science classes is of crucial importance concerning the relevance of the teaching situation as seen from the learners' perspectives. The ROSE-questionnaire contains 108 items of the type "I would like to learn about..." followed by a science-related topic such as "Light around us that we cannot see", "Cloning of animals" and "Epidemics, diseases causing large

Item	Statement	Mean			Mean difference		Country
		Girls	Boys	All	G-B		
F04	School science has opened my eyes to new and exciting jobs	2.05	2.39	2.22	-0.34	Sig.	Japan
		2.00	2.29	2.14	-0.29	Sig.	England
		1.81	2.18	1.99	-0.37	Sig.	Denmark
F08	I think that the science I learn at school will improve my career chances	2.13	2.51	2.33	-0.38	Sig.	Japan
		2.73	2.99	2.85	-0.26	Sig.	England
		2.06	2.29	2.17	-0.23	Sig.	Denmark
F14	I would like to become a scientist	1.29	1.82	1.56	-0.53	Sig.	Japan
		1.54	1.88	1.70	-0.34	Sig.	England
		1.39	1.75	1.56	-0.36	Sig.	Denmark
F15	I would like to have as much science as possible at school	1.75	2.18	1.97	-0.43	Sig.	Japan
		1.76	2.09	1.92	-0.33	Sig.	England
		1.62	1.90	1.75	-0.28	Sig.	Denmark
F16	I would like to get a job in technology	1.35	1.99	1.68	-0.64	Sig.	Japan
		1.66	2.46	2.04	-0.80	Sig.	England
		1.46	2.42	1.92	-0.96	Sig.	Denmark

Table 2: Student mean scores and gender differences for the five items defining the analytical dimension "Future and career"

Item	Statement	Mean			Mean difference		Country
		Girls	Boys	All	G-B		
G01	Science and technology are important for society	2.96	3.21	3.09	-0.25	Sig.	Japan
		2.90	3.09	2.99	-0.19	Sig.	England
		3.03	3.17	3.10	-0.14		Denmark
G02	Science and technology will find cures to diseases such as HIV/AIDS, cancer, etc.	3.23	3.22	3.23	0.01		Japan
		3.40	3.19	3.30	0.21	Sig.	England
		3.24	3.11	3.18	0.13		Denmark
G03	Thanks to science and technology, there will be greater opportunities for future generations	2.79	2.92	2.86	-0.13		Japan
		3.22	3.21	3.22	0.01		England
		2.91	3.00	2.96	-0.09		Denmark
G04	Science and technology make our lives healthier, easier and more comfortable	2.63	2.78	2.71	-0.15		Japan
		3.06	3.07	3.07	-0.01		England
		2.67	2.86	2.76	-0.19	Sig.	Denmark
G05	A country needs science and technology to become developed	2.78	2.95	2.87	-0.17	Sig.	Japan
		2.80	2.94	2.87	-0.14	Sig.	England
		3.05	3.07	3.07	-0.02		Denmark

Table 3: Student mean scores and gender differences for five items defining the analytical dimension "Science, technology and society".

loss of life". An analysis of the responses to these 108 items will show which topics would make science classes more relevant to the students, with regard to the content being taught.

Results

In order to reduce the complexity of the data, a coding of the responses with the assumption of a linear scale is adopted in the present analysis of student responses. The mean score of a particular item is thus calculated by assigning scores (1, 2, 3, 4) to responses in the four categories ranging from "Disagree" to "Agree" (in the case of e.g. F- and G-items). This representation of data simplifies the initial analysis and leads to some general conclusions concerning the four above-mentioned relevance dimensions.

In tables 1-3 the means for the item groups defining the relevance dimensions 1-3 are calculated for the respondents from the Japanese, English and Danish national samples. The means are shown for girls, boys and for all respondents in the national samples. The sample sizes are 560, 1266 and 538 for Japan, England and Denmark. In addition the gender difference defined as Mean(girls)-Mean(boys) is shown as well as a note of whether this difference is statistically significant ('Sig.') for the specific samples size as indicated by a two sample *t* test with a 95 % confidence interval. With the applied linear scale a mean score of 2.5 for a particular item is to be considered neutral and indicating neither noteworthy positive nor negative mean attitude towards the corresponding statement.

Table 1 shows that the perceived relevance in the everyday perspective is generally below the neutral line for the Danish students and with no significant gender differences on any items. For the Japanese and English samples, two and three items respectively, score above 2.5, while two items score below. The item F07 scores relatively highly for all three samples, while the item F09 scores low. The latter item reflects a key element in many science curricula: the aim to foster the critical

ability. The Japanese sample features significant gender differences for four items. The overall conclusion is that science classes in Japan and England are not overwhelmingly relevant to students seen from the 'everyday life' perspective, while they seem to be of even less relevance in Denmark.

The results from responses concerning the "Future and career" dimension are thought-provoking. Firstly, the mean values for the national samples are significantly below 2.5 for all items with F08 in England as the only exception. Somehow British schools seem to be good at communicating the message to the pupils that science can improve career chances, while this is apparently far from the case in Denmark and Japan; especially concerning the girls. Secondly they are strong gender differences for all items in all three samples, indicating that the future and career aspect of science classes is much weaker for

F16. I would like to get a job in technology				
	Disagree	>>>>	Agree	
Girls				
> Japan	75	19	3	3
> England	56	27	13	4
> Denmark	67	24	7	3
Boys				
> Japan	43	26	19	12
> England	26	24	28	21
> Denmark	24	29	28	19

Table 4: Frequency table (percentages) showing student responses to the statement "I would like to get a job in technology"

Item	Statement	Mean			Mean difference	
		Girls	Boys	All	G-B	
C13	Why we dream while we are sleeping, and what the dreams may mean	3.34	2.34	2.85	1.00	Sig.
A40	How to exercise to keep the body fit and strong	3.24	2.74	2.99	0.50	Sig.
E11	What we know about HIV/AIDS and how to control it	3.20	2.58	2.90	0.62	Sig.
E13	How different narcotics might affect the body	3.18	2.65	2.93	0.53	Sig.
E09	Sexually transmitted diseases and how to be protected against them	3.16	2.66	2.91	0.50	Sig.
E12	How alcohol and tobacco might affect the body	3.14	2.68	2.92	0.46	Sig.
E08	Cancer, what we know and how we can treat it	3.12	2.60	2.87	0.52	Sig.
E10	How to perform first-aid and use basic medical equipment	3.12	2.70	2.92	0.42	Sig.
A37	What to eat to keep healthy and fit	3.11	2.35	2.73	0.76	Sig.
A38	Eating disorders like anorexia or bulimia	3.03	1.81	2.43	1.22	Sig.

Table 5a: Mean scores for the 10 highest scoring items among Danish girls in the ACE-section: "What I would like to learn about."

the girls. Danish boys and girls score lower on all items compared with the English and Japanese students, with the item (F16) concerning 'getting a job in technology' as the only exception (and F14 for the girls). The distribution of responses for F16 is shown in table 4 in which the large gender difference is even more striking. Roughly 60-75% of the girls completely reject the thought of making a career in technology. Only in England does the percentage of girls expressing any wish to work in this field exceed 10%. With respect to the boys, Japan seems to have a particular problem, since close to 70% generally disagree with the statement. The conclusion from this analysis is that with respect to the 'future and career' perspective, science classes in the three countries seem to be of little value in particular to girls and to the Danish boys.

In table 3 the mean values for the five items of the 'Science, technology and society' dimension are listed. The first thing to notice is that mean values in general are well above 2.5 indicating an overall large degree of acknowledgement of the importance of science and technology in creating better living conditions in the future and in general in enabling the development of societies. There is an especially strong belief in the potential for finding methods for curing diseases (G02), in particular among girls. Apart from this item, girls generally score lower on these items than boys, though the differences are far from the level featured in table 2.

Finally, table 5a and 5b give an example of how the value of science lessons may differ for groupings of students depending on the subject content taught in a specific class. The table shows the ten highest scoring items, for Danish girls and boys respectively, among the 108 ACE-items with the heading "What I would like to learn about". It is worth pointing out that girls' mean scores in table 5a are very high – indicating a strong agreement between the girls that these subjects are interesting. Also, the very large gender differences for these 10 items should be pointed out. Girls' interests seem to be focused on health, medicine, body and themes related to themselves. The corresponding table for the boys features mean values that are somewhat lower than observed for the girls and gender differences which are more varied. For seven of the items, the boys' mean scores are significantly higher than the girls' score, but when it comes to learning about life outside the earth and feeling weightless, no difference can be shown. There is even one item

("How to exercise to keep fit and strong") on the boys' top 10 list, for which the girls' score is higher. The boys' responses indicate a wish to learn about the dramatic and violent aspects of physics and chemistry and about how technology works. Finally it should be mentioned that Jenkins (Jenkins & Nelson, 2005) has published a range of analyses based on the English ROSE-data and includes the English "Top-10 lists" corresponding to table 5a and 5b. There is a striking resemblance between the two sets of lists with eight of ten possible overlapping items for the girls and six of ten overlapping items for the boys. More results from the national Japanese ROSE-study can be found in (Ogawa, 2004), whereas a range of analyses of Danish results is available on the homepage for the Danish ROSE-project: www.dpu.dk/rose.

Discussion

The results of the analysis presented in this article are very well summarized by the title of the recent paper by the English ROSE-team (Jenkins & Nelson, 2005) "Important but not for me: students' attitudes towards secondary school science in England". We have shown that English, Japanese and Danish 15-years olds find school science only moderately relevant from an everyday perspective and of little value from a 'future and career' point of view. The last conclusion is especially pronounced for girls in all three countries and for Japanese boys as well. On the other hand, there is a clear acknowledgement of the benefits of science and technology for society and for the individual in terms of development, finding cures for diseases and creating better living conditions in general.

Summing up, there seems to be an understanding among young people of the fact that knowledge- and technology-based societies need more scientists, but at the same time a lack of will and motivation to devote one's own working life to support this development. In (Schreiner & Sjøberg, 2005) a preliminary international comparative analysis including all ROSE-countries has been presented. It is clear from this work that (generally speaking) northern European countries and Japan, followed by Eastern and Southern European countries tend to score lowest on the three 'relevance' dimensions presented in tables 1-3. At the other end of the scale, African countries (from mainly south of the Sahara) score very high and are followed by the participating Asian countries with only somewhat lower scores.

Item	Statement	Mean			Mean difference	
		Girls	Boys	All	G-B	
A30	How the atom bomb functions	2.28	3.05	2.67	-0,77	Sig.
C07	How computers work	2.17	3.00	2.58	-0,83	Sig.
A31	Explosive chemicals	1.94	2.87	2.40	-0,93	Sig.
A32	Biological and chemical weapons and what they do to the human body	2.28	2.87	2.58	-0,59	Sig.
A34	How it feels to be weightless in space	2.74	2.78	2.76	-0,04	
C08	The possibility of life outside earth	2.87	2.78	2.83	0,09	
C04	How cassette tapes, CDs and DVDs store and play sound and music	2.00	2.77	2.38	-0,77	Sig.
A40	How to exercise to keep the body fit and strong	3.24	2.74	2.99	0,50	Sig.
C03	The use of lasers for technical purposes (CD-players, bar-code readers, etc.)	1.84	2.72	2.27	-0,88	Sig.
E41	Very recent inventions and discoveries in science and technology	2.09	2.71	2.40	-0,62	Sig.

Table 5b: Mean scores for the 10 highest scoring items among Danish boys in the ACE-section: "What I would like to learn about"

It is important to develop a better understanding of the reasons for the "Science is important but not for me"-attitude in order to secure a high level of scientific literacy in the population and to increase recruitment to science and technology studies. An understanding of the (post-)modern society, of the youth cultures created by this society and of the latent attitudes towards science within these cultures is a prerequisite in order to make the changes necessary in school science. The ROSE-study will produce the evidence-based characteristics of these attitudes, which, combined with proper sociological theories, will hopefully provide us with the necessary qualitative understanding. ■

About the Author

With a Ph.d. in physics from the Niels Bohr Institute, Henrik Busch moved in 1998 from the field of research in nanoscience in to research in science education. He is currently an associate professor at The Danish University of Education in Copenhagen. Lately has co-authored the strategy plan for science education on behalf of the Danish Ministry of Education, he is chief-editor of the first Danish research-based journal of mathematics- and science education and he is the leader of the Danish ROSE-project.

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References

- Andersen, N., Busch, H., Horst, S., & Troelsen, R. (Eds.). (2003). *Fremtidens naturfaglige uddannelser. Naturfag for alle - vision og oplæg til strategi* (Vol. 7). København: Undervisningsministeriet, Uddannelsesstyrelsen. (In Danish, but with an English summary)
- Jenkins, E. W., & Nelson, N. W. (2005). Important but not for me: Students' attitudes towards secondary school science in England. *Research in Science and Technological Education*, 23(1).

Kolstø, S. D. (2001). Scientific literacy for citizenship: Tools for dealing with the science dimension of controversial socioscientific issues. *Science Education*, 85, 291-310.

Millar, R., & Osborne, J. (Eds.). (1998). *Beyond 2000: Nuffield Foundation*.

Ogawa, M. (2004). Three Distinctive Groups among Japanese Students in terms of their School Science Preference: From Preliminary Analysis of Japanese Data of an International Survey 'The Relevance of Science Education' (ROSE).

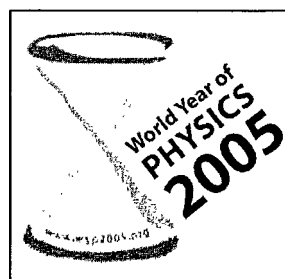
Journal of Science Education in Japan, 28(4), 279-291."

Osborne, J. (2003). Attitudes towards science: A review of literature and its implications. *International Journal of Science Education*, 25(9), 1040-1079.

Schreiner, C., & Sjøberg, S. (2004). Rose - the relevance of science education (No. 4/2004). Oslo: ILS (www.ils.uio.no/forskning/rose/)

Schreiner, C., & Sjøberg, S. (2005). Harvesting the bouquets of rose (2) diagrams with national mean scores for girls and boys in questions b, d, f and g in the rose questionnaire. Oslo: ILS (www.ils.uio.no/forskning/rose/)

The High Level Group on Increasing Human Resources for Science and Technology in Europe. (2004). *Europe needs more scientists - increasing human resources for science and technology in europe: European Commission - Directorate C: Science and Society*.



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Women on the RISE

The number of women faculty is growing, thanks in part to institutional efforts to fight discrimination and help with family demands

By Kate Fodor



Early this year, Harvard University President Lawrence Summers made his now-famous remarks speculating that female scientists may have difficulty winning tenured faculty positions because of differences in "intrinsic aptitude."

Jong-on Hahm, who directs the Committee on Women in Science and Engineering at the National Research Council, says the furor these comments engendered has actually had positive effects on the debate about discrimination against women in academic science. "A lot of people would actually like to drink a toast to him for making the issue so visible," Hahm says. "The subject used not to be discussed much except within certain circles. Now it's out there."

In the aftermath of the remarks, a number of universities, including Harvard, have taken steps to improve the climate for female scientists and

other women on their campuses. Harvard formed task forces on women faculty and on women in science and engineering in February. They released recommendations for sweeping changes in May, and the university has earmarked \$50 million over the next 10 years to pay for reforms.

COMMITMENT PAYS OFF

Harvard's Cambridge neighbor, the Massachusetts Institute of Technology, provides evidence that real change is possible. MIT undertook a series of reforms in the mid-1990s after a group of female scientists there found evidence that women were receiving lower salaries and fewer resources than their male counterparts.

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In 1990, women made up only 10% of MIT's faculty, but that number had risen to 18% by the fall of 2004. In the years between 1990 and 2004, MIT appointed its first five female vice presidents. In addition, women now lead the Department of Earth, Atmospheric, and Planetary Sciences, the Technology and Policy Program, the Center for Environmental Health Sciences, the Laboratory for Nuclear Science, the Biotechnology Process Engineering Center, and the Center for Space Research. Susan Hockfield, a neuroscientist who had served as the provost at Yale, was appointed MIT's first female president in 2004.

Many of MIT's new female-friendly practices are actually family-friendly, too, including child-care scholarships, tenure-clock extensions, and reduced time appointments for faculty with family demands. "What we're trying to do is provide the flexibility that allows people to take care of their family issues at critical junctures so they don't have these awful choices of doing one or the other," Hockfield explains.

BEYOND THE PIPELINE

Conventional wisdom has sometimes held that fewer women than men have desirable positions in university science departments because fewer women than men pursue high-level studies in the sciences. Research suggests that this is not the case.

A study conducted at Congress' request by the Government Accountability Office (GAO) last year shows that the number of women pursuing degrees in science, and particularly in the life sciences, has grown considerably over the last 30 years or so. Women made up 63% of students who pursued or received bachelor's degrees in the life sciences in 1999-2000. The numbers were less robust for graduate studies, but still very strong, with women making up 51% of students pursuing or receiving degrees in the life sciences.

The GAO's findings were striking, however, when it came to how women fared in the academic job market. The report cites a 2003 study conducted by researchers at the University of Oklahoma showing that only about 15% of full professors and 25% of associate professors in biological science departments at research universities were women. The numbers were worse for other scientific disciplines, including chemistry, physics, and engineering.

"Getting more women into the pipeline isn't the major part of the problem," says Sonya Summerour Clemmons, who was the first African American woman to earn a PhD in bioengineering from the University of California, San Diego, and is now a consultant on diversity in science. "I know a network of women who have their PhDs, have their MDs, have their MBAs, and they still have problems. When you get your education, that just means that you're starting out at the bottom of another ladder. You still have to pay your dues in a man's world."

Elizabeth Ivey, president of the Association for Women in Science (AWIS), agrees. She says the pipeline contains enough strong female candidates that it's surprising not only that there aren't more women in full professorships, but also that there aren't more in leadership positions. "There have been enough women in the life sciences pipeline for a number of years that there should be more managers and department chairs and deans who are women."

RECRUITING ISSUES

Part of the problem is that most universities simply aren't holding their search committees and recruiters accountable for finding diverse candidates, AWIS executive director Nancy Bakowski says. "The people are out there, but they're a little harder to find, so you really have to push the recruiters

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or whoever you're using to look beyond their typical pool."

Diversity plans need to contain provisions for measurement and accountability, Ivey agrees. "Plans have been required in a number of institutions, but there's generally no negative consequence for not meeting the goals. Accountability won't happen unless the guy at the top pushes those beneath him in terms of, 'What have you done?'"

That issue will be addressed at Harvard, where the task forces appointed this year recommended hiring a senior vice provost for diversity and faculty development to oversee faculty appointments. Harvard said it would move to fill the position immediately.

Stanford University is also taking steps to increase oversight of search committees when it comes to diversity issues, according to vice provost for faculty development, Patricia Jones. A new policy requires the leaders of each search committee to meet with the faculty recruitment and development office to discuss diversity expectations, she notes.

However, even if academic institutions do make an effort to recruit and promote diverse candidates, changes to the top tiers of university science will likely be slow. "Given the institutional arrangements for promotions in academics, you're unlikely to see big jumps quickly," says Jerome Bentley, who chairs the economics department at Rider University and authored a 2004 study on women in science for the National Science Foundation. "The whole process takes so long: The typical tenure track is six years, and generally there's a lag between associate professor and full."

Another factor is the tenure system itself, which allows people in the highest ranks to stay put for decades. "If you have a workforce that's primarily white male and they're tenured, you can't fire them," Bentley notes. "You have to wait."

FAMILY AFFAIRS

Studies show that family demands are another major source of women's difficulties in the academic job market. "Being married and having children doesn't hurt men's careers, but it does seem to hurt women's careers," Bentley says. "We found that being married and having children explained a substantial part of lower tenure and promotion rates among women."

One solution being tried at some universities is to allow faculty members to extend the seven-year probationary period during which they establish their records for tenure by up to a year in order to give them time to care for a newborn or newly adopted child. The policy is recommended by the American Association of University Professors, which points out in its position statement that many women are hampered by the fact that "the period of most intensive work to establish an academic career coincides with prime childrearing years."

Allowing faculty members to stop the tenure clock is a step in the right direction, but it's not a panacea, warns Bakowski, because having a policy on the books doesn't necessarily mean that people who take advantage of it aren't penalized in some way.

Princeton University was concerned enough about that question that the school made a major change last spring: Its tenure-clock extensions are now automatic for both male and female faculty when a child is born or adopted. The change was made based in part on survey data showing concern among faculty that requesting an extension might be seen as a sign of weakness, according to Joan Girgus, special assistant to the dean of the faculty. "Now the onus is on the university, and there's no interpretation that can be made about it by your department, colleagues, or peers," she notes. Faculty

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members who don't want their tenure clocks stopped for a year while they care for a new child must submit a request to that effect.

Daycare is another essential. MIT not only offers daycare, now in a brand-new building at the center of campus, but it also gives out about \$500,000 in child-care scholarships to students, faculty, and staff each year. In addition, it reserves spots for the children of junior faculty it's recruiting.

Girgus agrees that childcare is key, not only for recruiting and retaining faculty, but also for attracting top-flight graduate students and postdocs. Princeton already has two affiliated daycare centers on campus, which serve about 150 children between them, but an expansion is needed, she says. The university formed a working group last June to investigate how best to increase its daycare offerings, and it hopes eventually to double the number of children served.

Because women bear most of the burden of caring for aging family members, eldercare programs can be another important support component for female faculty. Stanford partners with a local nonprofit agency to offer services to faculty and their families, including out-of-home care, social worker consultations, support groups, and hot lunches designed to meet the nutritional needs of the elderly.

SKILL BUILDING

In addition to pushing institutions to better meet women's needs, it's important to educate women themselves about what they can do to get ahead, Ivey says, noting that AWIS is planning some workshops on tricks of the trade.

One thing women can do is to publish earlier and more often. "Women researchers don't tend to publish their results until they're very near the end of their project, whereas male researchers will publish intermediate results all along the way, so they build maybe three articles on a project where women tend to have only one," she notes. Women should also aim for publication in bigger journals, Ivey adds. "They shouldn't feel that they'd better try a lesser journal first just to float the idea, because men don't do that. They go for broke."

AWIS also hopes to teach women how to be tougher negotiators and to get themselves onto the programs at major conferences. "We want to teach them some skills that they may not have because they're not being mentored," Ivey says. "It's not that the men are smarter about these things coming in, it's that the men are getting mentored."

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