Relatório da estadia nos EUA,
de Nov. 1991 a Março de 1992, e de Abril a Julho de 1992,
durante as férias sabáticas de **Paulo M S Tavares de Castro**

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Porto, Março de 1993

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Introdução

Após ter obtido o doutoramento em 1980, já há algum tempo poderia o signatário ter beneficiado da sua primeira licença sabática, nos termos do Estatuto da Carreira Docente Universitária. Excesso de ocupação com a administração do seu Departamento, e contínua supervisão de alunos de pós-graduação, justificaram sucessivos adiamentos, até que, em 1991, foi tomada a decisão de que estava chegada a altura.

Uma hipótese para a ocupação da referida licença seria a permanência na Faculdade de Engenharia da Universidade do Porto (FEUP). Mas nesse caso dificilmente o dia-a-dia seria diferente do usual, com a única excepção de não dar aulas; ora sendo justamente o acto de leccionar um dos maiores atractivos que o signatário encontra na carreira que escolheu, compreende-se que tal situação não reunia atractivos suficientes para ser sequer considerada.

Fora da FEUP, era de interesse uma situação que facilitasse uma actualização de conhecimentos em áreas técnicas de interesse, (como por exemplo o comportamento mecânico de materiais, incluindo problemas de fractura e fadiga), mas também que permitisse um alargamento de perspectivas, proporcionando novos conhecimentos - tecnológicos ou não - e o estabelecimento de uma rede de contactos pessoais, em outras áreas de interesse como a gestão da tecnologia, gestão do ensino superior, técnicas pedagógicas, biblioteconomia, etc. .

Um antigo fascínio pelos Estados Unidos da América, aliado à convicção de que naquele País se encontram das (ou, simplesmente, 'as' ?) melhores universidades do planeta, se faz investigação do mais alto calibre nas universidades e laboratórios não universitários, e se encontram problemas industriais do maior interesse, motivou a escolha de dedicar a maioria do tempo da licença sabática a uma estadia nos EUA. Tendo leccionado o início da disciplina Orgãos de Máquinas e Anteprojecto na FEUP desde o início de Outubro de 1991 até finais de Novembro (já que a licença sabática, mesmo nos EUA, não parecia razão suficiente para deixar de conhecer um curso da licenciatura que lecciona ininterruptamente desde 1980), iniciou-se a estadia nos EUA em finais de Novembro de 1991.

A circunstância de, por convite da Fundação Luso Americana para o Desenvolvimento (FLAD), estar associado ao programa AMMIOP *(Advanced Materials and Manufacturing International Outreach Program)*, que fomenta contactos entre a Lehigh University e diversas instituições Portuguesas, facilitou a escolha daquela universidade privada da costa leste para a primeira parte da estadia nos EUA. Relações antigas com o Professor I. Finnie, da University of California at Berkeley, determinaram a escolha daquela universidade estatal da costa oeste para a segunda parte.

Durante a estadia na Lehigh University registou-se a oportunidade para diversas actividades, como os congressos da American Society of Mechanical Engineers (ASME) em Atlanta e da Society of Automotive Engineers (SAE) em Detroit, visitas a diversas universidades, e contacto

continuado com os bolseiros portugueses em Lehigh (Engos J. A. Barros Basto, F. J. Lino Alves, José Maria Albuquerque, João Paulo Gonçalves, Carlos L. L. Fernandes, e João C. D. Duarte, todos do programa AMMIOP, e Engª Maria Inês Carvalho, do programa CIENCIA). Foi ainda um privilégio poder assistir a aulas dos Professores Wei, Gardiner, e Bean, entre outros.

Durante o segundo período visitou-se Seattle para contactos com um bolseiro do Departamento de Engenharia Mecânica e Gestão Industrial da FEUP (DEMEGI) - o Eng. José Magalhães -, e Iowa City para frequentar um NATO *Advanced Study Institute*, e foi estudada a técnica desenvolvida pelo Prof. I. Finnie e pelo Dr. W. Cheng para a determinação de tensões residuais recorrendo a conceitos da Mecânica da Fractura.

As secções 2 a 5 deste relatório listam de maneira sistemática actividades como conferências, seminários e visitas, referindo-se, em particular, seminários apresentados pelo signatário na Lehigh University, na University of Maryland, e na University of California at Berkeley, bem como os encontros relativos ao problema de Timor em Lehigh e em Berkeley, a que o signatário esteve associado.

A estadia terminou com 3 semanas passadas na Carnegie Mellon University, em Julho de 1992, a frequentar um curso intensivo sobre gestão de universidades.

Este relatório, deliberadamente sintético, está organizado sobre a forma de listagens, que sugerem a variedade de experiências de que o signatário pôde beneficiar. Foi reunido material em diversas áreas, nomeadamente para actualizar o ensino e a investigação a que está mais directamente ligado na FEUP (secções 6 e 7 deste relatório), bem como brochuras e catálogos de instituições de ensino superior, que, no seu conjunto, constituem uma importante fonte para o estudo deste sistema (secção 8). Em anexo apresenta-se um artigo já publicado, em consequência da estadia nos EUA, relativo ao tópico 'gestão do ensino superior'. Entendeu-se que, para não atrazar este relatório, ele devia ser apresentado sem mais demora; naturalmente, as consequências desta estadia nos EUA continuarão a fazer-se sentir na futura acção do signatário.

A estadia nos EUA confirmou a ideia de que os seus cidadãos são comummente de trato amistoso e cortês - uma agradável constatação para quem está habituado à comparativa secura ou mesmo rudeza praticada pela Europa fora ... . A juventude do País, a muito diversificada origem étnica dos seus habitantes, o *'melting pot'* (ou será *'fruit salad'* ... ?) que integra essa diversidade, o património paisagístico e urbano, tudo concorre para o fascínio dos EUA. Neste contexto, é de lastimar que o governo dos EUA mantenha relativamente a Portugal a exigência de visto para entrada, o que se afigura discriminatório já que se trata de uma situação excepcional na Europa ocidental. Espera-se que a multiplicação de contactos académicos, o fomento dos negócios e trocas comerciais, um melhor conhecimento mútuo - como a FLAD procura a todo o momento incentivar -, contribuam para a ultrapassagem desta pequena, mas sensível, sombra que o cidadão comum detecta no relacionamento Portugal-EUA.

O autor deseja agradecer a todas as instituições que tornaram possível esta estadia nos EUA, designadamente a Universidade do Porto, a Lehigh University, e a University of California at Berkeley; agradece particularmente à Comissão INVOTAN, e à Fundação Luso Americana para o Desenvolvimento, os apoios concedidos. Agradece ainda, aos seus Colegas da equipa docente de Orgãos de Máquinas e Anteprojecto na FEUP - particularmente ao Prof. Luís Andrade Ferreira - o terem proporcionado as condições necessárias para assegurar o serviço docente.

Last but certainly not least, é devido particular reconhecimento a diversas pessoas pelo interesse e boa vontade que dedicaram a este projecto e, sobretudo, pela amizade com que quiseram distinguir o signatário. Entre estas, queria destacar os Senhores Charles Buchanan e Dr. Fernando Durão, da FLAD, Dr. Gary Miller e Prof. M. Harmer, da Lehigh University, e Prof. I. Finnie da UCBerkeley, além do velho amigo Dr. Nuno Rebelo, da Hibbitt, Karlsson & Sorensen em Fremont, CA .

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Conferências, visitas e exposições

Principia esta secção com uma referência específica a algumas das iniciativas em que o signatário participou. A lista completa é apresentada no fim desta secção.

ASME 112th WAM (112th Winter Annual Meeting da American Society of Mechanical Engineers), Atlanta, 1-6/12/1991

A principal motivação para a participação no ASME 112th WAM resultou do facto do signatário ser o *'correspondent'* da referida associação em Portugal, e, no exercício daquela função, se ter proposto promover a celebração de um convénio de cooperação entre a ASME e a Ordem dos Engenheiros.

Tendo sido convidado pela ASME para participar na reunião do seu Board of International Affairs, que teve lugar durante o dia 2 de Dezembro, para aí apresentar o ponto da situação no tocante às *démarches* realizadas junto da Ordem dos Engenheiros, foi-me possível informar em Atlanta que obtivera da Ordem dos Engenheiros um acordo de princípio para a celebração do referido convénio de cooperação. Na reunião do Board on International Affairs da ASME em Atlanta participaram, além dos membros do *board* e de alguns 'ASME *correspondents'*, o Presidente da ASME bem como o '*Past President'*. Recordando-se que a ASME tem mais de cem mil membros, e o calendário intensivo de apresentações científicas e outras reuniões que tiveram lugar durante o 112th WAM, estas participações ilustram a importância que a ASME atribui às relações internacionais.

Na sequência daquela reunião, e contactos subsequentes, está previsto para o próximo dia 7 de Maio de 1993, na sede da Ordem dos Engenheiros em Lisboa, a assinatura do referido convénio, que entre outras coisas prevê o reconhecimento aos membros de uma associação do direito de beneficiar de algumas das regalias concedidas aos membros da outra, no tocante por exemplo a descontos na participação em congressos e na aquisição de publicações. Os membros da Ordem dos Engenheiros ficarão assim com a possibilidade de adquirir as publicações técnicas e científicas da ASME por metade do seu preço de capa. Para a assinatura do convénio desloca-se a Portugal uma delegação ao mais alto nível da ASME, incluindo o seu Presidente A. Falcon e o *Executive Director* D. Belden.

Na parte técnico-científica, o signatário seleccionou do vasto programa de sessões simultaneas designadamente as seguintes

COED-1 Design in Mechanical Engineering;
EEP-9 Symposium Manufacturing Processes and Materials - Challenges in Microelectronic Packaging: Design for Manufacturability;

CPA-1 Panel on Transportation in a National Energy Strategy: Are Maglev and High Speed Rail Viable Options;
MGT-2 Towne Lecture (por R. Dorne, Cadillac, GM Detroit);
PVP-4 Symposium on Recent Advances in Structural Mechanics - II: Fracture and Fatigue in Composites;
PE-2B Symposium on Mechanics of Plastics and Plastic Composites;
RT-I e RT-2 Advances in Freight Car Engineering;
MAT-4B Symposium on Mechanics of Plastics and Plastic Composites: Failure of Plastics;
MAT-5B e MAT-6B Symposium on Mechanics of Plastics and Plastic Composites: Failure of Composites;
AERO-2A Symposium on Structures and Materials for Emerging Systems: Creep-Fatigue Interaction at High Temperature-II
MAT-8 Nadai Award Lecture (por J. W. Hutchinhson, Harvard University);

O signatário aproveitou ainda para seleccionar do programa de visitas técnicas as seguintes: (i) Georgia Institute of Technology - Manufacturing Research Center, e (ii) MARTA - Metropolitan Atlanta Rapid Transit Authority.

No Georgia Tech foram apresentadas, entre outras realizações, os modelos informáticos de planeamento para os Jogos Olímpicos que decorrerão naquela cidade, enquanto na MARTA foram visitados os serviços de manutenção. Cerca de 35% das despesas *(operating budget)* deste serviço de transporte colectivo são cobertas pelas *fares* pagas pelos passageiros.

O *'Highlight Topic'* desta 112th WAM da ASME era 'Transportation for the 21st Century'. Uma parte significativa do programa da conferência era assim dedicado a temas relacionados com a industria dos transportes.

As *'keynote addresses'* foram apresentadas por P. Reames e J. Vostrez, respectivamente director do Western National Transportation R&D Center, e deputy director da Intelligent Vehicle Highway Systems Inc.. Ambas estas palestras tiveram carácter prospectivo, a primeira descrevendo uma instalação laboratorial que está em fase de concepção, e a segunda tendências futuras para a circulação em auto-estrada, incluido o recurso intensivo a tecnologias da informação.

A sessão 'CPA-1 Panel on Transportation in a National Energy Strategy: Are Maglev and High Speed Rail Viable Options' constituiu uma oportunidade para apreciar como em meios esclarecidos dos EUA se encara a necessidade de investimentos em sistemas de transporte colectivo de passageiros. O painel contou com intervenções do *'former Director of Research* ' da British Railways, de um cientista do Argonne National Laboratory, do Chief Engineer do Committee on Science, Space and Technology da US House of Representatives, e do Presidente da Bombardier Corporation (que se propoe construir o sistema de TGV do Texas, com tecnologia do TGV Francês).

A 'Towne Lecture' foi proferida por Robert Dorne, Chief Engineer da Cadillac Motor Car Division da General Motors Corporation, e teve por título 'The Cadillac Management Story'. Tratou-se de uma oportunidade para ouvir um alto responsável da industria automóvel dos EUA discutir com abertura a crise daquela industria e passos que estão a ser dados no

sentido de a ultrapassar, particularmente a adopção de procedimentos de garantia da qualidade. Notei particularmente um comentário do orador, em resposta a uma pergunta no fim da sua conferência, afirmando que *electrical engineers are better suited to Cadillac's business* , o que justificou invocando a melhor formação destes na area de sistemas.

A conferência do Prof. J. Hutchinson da Harvard University (Nadai Award Lecture) consistiu numa revisão do seu trabalho de modelização do comportamento não linear de materiais compósitos.

A existência permanente de 6 sessões paralelas implicou que o signatário apenas pôde testemunhar uma pequena parte do muito que se passou no 112th WAM.

7th Annual Technological Literacy Conference, NASTS (National Association for Science, Technology and Society), Alexandria, VA, 6-9/2/1992

A participação neste congresso resultou do interesse que o signatário dedica ao problema do contexto social da ciência e da tecnologia. Através da acção em Portugal da ACTD - Associação de Ciência e Tecnologia para o Desenvolvimento (nos tempos recentes excessivamente discreta ...), o signatário foi-se apercebendo que esta temática era, em países desenvolvidos, objecto de crescente atenção designadamente nos meios universitários. Foi assim natural aproveitar a oportunidade da estadia nos EUA para contactar e conhecer a comunidade activa nesta área, aproveitando para o efeito a reunião anual da NASTS (National Association for Science, Technology and Society) em Alexandria, VA . O movimento STS (Science, Technology and Society) preocupa-se designadamente com

- os efeitos da ciência e tecnologia sobre a sociedade, nomeadamente no que se refere a questões éticas e de valores,
- a comunicação entre as comunidades científicas e técnicas e o público em geral, designadamente através da educação, dos *media*, etc. ,
- a avaliação da ciência e tecnologia, e o papel dos cidadãos nesse processo,
- os efeitos dos valores sociais e do conhecimento na condução da ciência e tecnologia, particularmente no que se refere à definição de políticas, à regulamentação da investigação, às prioridades de financiamento e às oportunidades de emprego e educação.

O *highlight* do congresso foi a conferência plenária proferida por Lester Brown, presidente do World Watch Institute, em 7 de Fevereiro.

Entre as diversas actividades em que o signatário participou, destaca-se o *workshop* 'Teaching Materials Science and Technology - a Hands-on Workshop for K-12 Teachers', com a participação de Gary Miller (Lehigh Univ.) e Steve Piippo (Richland High School, Estado de Washington), onde foram discutidas e ilustradas técnicas pedagógicas para educar e fomentar o interessse pela Ciência e Tecnologia dos Materiais, bem como o *panel* STS/International, com a participação de Leonard Waks e Carl Mitcham, da

Penn State, Lars Fuglsang (Roskilde Univ., Dinamarca), e G. Fourez, Univ de Namur, Bélgica), onde foi discutida a diversidade de caminhos que as diversas comunidades activas em assuntos STS tem adoptado.

Weibull Analysis RMS (reliability, maintainability, safety, supportability)/ ILS Modeling workshop, Detroit, Society of Automotive Engineers, 24-28/2/1992

Integrado no '1992 SAE International Congress & Exposition', Cobo Center, Detroit, decorria um vasto programa de cursos intensivos, tendo o signatário e o Dr. Gary Miller (da Lehigh Univ.) participado no Weibull-Log Normal Analysis Workshop, leccionado integralmente pelo Dr. Robert Abernethy. Este curso intensivo teve 20 participantes, em que, além dos referidos, se contavam engenheiros da Honda of America, Hawker Siddeley, Caterpillar, etc.

As distribuições de Weibull, Poisson, log normal, exponencial e binomial formam a base do RMS Engineering (reliability, maintainability, safety, supportability), e foram examinadas nos primeiros dois dias do curso. Em seguida foi examinada a simulação de Monte Carlo, e usando PCs e *software* que foi distribuido aos participantes, foram estudados diversos *case studies*, alguns dos quais resultantes da experiência acumulada pelo Dr. Abernethy na Pratt & Whitney. Foi ainda aplicada a distribuição de Weibull a resultados de ensaios mecânicos de materiais, muito simples, realizados durante o curso intensivo.

Esta visita a Detroit proporcionou a frequência da exposição industrial da SAE no Cobo Center, que contava com cerca de 780 companhias a exibir os seus produtos e serviços. Infelizmente, a sobreposição de horário com o referido *workshop* impediu a participação em algumas sessões do congresso que pareciam particularmente interessantes.

NSF (National Science Foundation) Chautauqua Short Course Program, course 16: Science, Technology and Society: Integrative General Education, Temple University, Philadelphia, 5-7/3/1992

Tratou-se de um curso intensivo, ministrado pelo Prof. Leonard Waks, da Pennsylvania State University, subordinado ao tema 'The New Approach to Integrative General Education', no qual participaram 29 delegados.

O programa incluia de início referência aos problemas ecológicos e éticos da ciência e tecnologia, e à alfabetização científica e tecnológica dos cidadãos. Em seguida, os participantes foram divididos em grupos, para elaboração de programas possíveis para o ensino de STS a não tecnológos ou cientistas, nas universidades. O formato deste curso intensivo, recorrendo abundantemente a trabalho de grupo para a elaboração de projectos, e em seguida à sua apresentação e discussão

colectiva, permitiu um enriquecimento pessoal interessante, dada a diversidade dos participantes.

NATO Advanced Study Institute on Concurrent Engineering, University of Iowa, Iowa City, 24/5-6/6/1992

Tratou-se de participar no NATO ASI (Advanced Study Institute) 'Concurrent Engineering Tools and Technologies for Mechanical System Design', uma iniciativa do Prof. E. Haug da University of Iowa, que estivera para ser organizado em 1991, e que acabou por ser adiado para 1992, coincidindo portanto com a estadia do signatário na costa oeste.

O tema *'concurrent engineering'* desperta correntemente grande interesse. Trata-se, numa definição simplificada, de procedimentos de concepção simultânea dos produtos e dos respectivos processos de fabrico, recorrendo às ferramentas de CAE, *computer aided engineering.* O recurso a estes procedimentos é visto como facilitando a competitividade das empresas, já que assim se diminui o tempo necessário para o lançamento de novos produtos, assegurando simultaneamente que a qualidade fica garantida da forma mais adequada.

Esta actividade estendeu-se por duas semanas, e contou com a participação de 16 palestrantes e cerca de 60 participantes. Entre os palestrantes contava-se o Prof. Don Clausing, do MIT, que leccionou o tópico 'The evolution of concurrent engineering and design for quality', o Prof. E. Haug e o Dr. K. Choi da University of Iowa.

Muitas das sessões foram dedicadas a temas como a simulação e a optimização, tendo sido proporcionado aos participantes uma visita ao laboratório de simulação dinâmica do comportamento de veículos da University of Iowa (Center for Simulation and Design Optimization), liderado pelo Prof. Haug.

Durante este NATO ASI o signatário teve a oportunidade de conhecer um investigador do NASA Ames Research Center, Moffet Field, CA, (Dr. Anthony André, Western Aerospace Labs. Inc., ao serviço da NASA Ames) tendo sido convidado para visitar aquele laboratório, o que viria a suceder em 25 de Junho de 1992

American Library Association 111th Annual Conference, Moscone Convention Center, San Francisco, exhibit, 27-30/6/1992

Tratava-se do grande acontecimento anual da American Library Association, que decorria este ano em San Francisco, portanto muito próximo de Berkeley; essa circunstância, associada ao interesse que o signatário dedica ao problema das bibliotecas, motivou a participação nesta iniciativa. Foi educativo ouvir as intervenções da *Representative* Patricia Schroeder (D-Colo.) e de Gloria Steinem, na sessão inaugural, criticando

severamente a administração Bush por propor um importante corte no orçamento das bibliotecas, tidas por um dos pilares de uma sociedade civilizada. Este encontro envolvia cerca de 20000 (vinte mil !) delegados, e a exposição contava com cerca de 1000 expositores, entre editoras, fornecedores de bases de dados (de teses, de jornais diários, de revistas científicas, só de índices, de índices mais texto completo, em *cd-rom* ou noutro suporte, etc., etc.), fornecedores de *hardware* para bibliotecas como mobiliário, fotocopiadoras adequadas (designadamente as que apresentam o vidro de leitura em ângulo, em vez de ser apenas plano, permitindo assim a fácil cópia de volumes encadernados sem danificar o volume ...), e *software* de gestão, para todos os tipos, tamanhos e orçamentos de bibliotecas. Notava-se ainda a presença de respeitadas instituições como a Library of Congress e outras.

Foi possível ao signatário reunir um importante volume de documentação sobre estes tópicos (responsável aliás por uma parte não negligenciável dos cerca de 90 kg enviados pelo correio para Portugal ...) que foi entregue ao bibliotecário do DEMEGI, com a recomendação de pesquisa atenta.

College Management Program, Carnegie Mellon University, Pittsburgh, 6-24/7/1992

A estadia nos EUA foi concluida com a participação no College Management Program, um curso intensivo residencial de 3 semanas, levado a cabo pela School of Urban and Public Affairs (agora designada 'The Heinz School') da Carnegie Mellon University, no respectivo *campus* em Pittsburgh. Esta actividade contou com 19 participantes, sobretudo *deans* ou *vice presidents* de universidades e *colleges* dos EUA. A docência esteve a cargo de 17 especialistas nos mais diversos assuntos releventes para a gestão de universidades, como *strategic management and planning* (Richard Cyert e George Keller), *leadership* (Hank Durand), relações com o governo (Charles Reed), *fund raising* (John Synodinos), problemas éticos (Peter Madsen), problemas legais (Perry Zirkel), etc., etc. .

2 - continuação

Listagem de conferências, visitas e exposições

'New Ceramics-New Properties' 1991 Hobart M. Kraner Award Symposium & Banquet, Sinclair Laboratory, **Lehigh University**, November 18, 1991

112th ASME (American Society of Mechanical Engineers) Winter Annual Meeting, **Atlanta**, December 1-6, 1991 (participação a convite da ASME no Board on International Affairs meeting, na qualidade de ASME *correspondent* em Portugal); visita ao **Georgia Institute of Technology** (Manufacturing Research Center)

visita à empresa DORST America, Inc., **Bethlehem**, (com o MSc em Manufacturing Systems Engineering da Lehigh University, e o Prof. Mikell Groover), Jan. 28, 1992

Parsons School of Design, New School for Social Research, **New York**, 'Business Etiquette for the 90's', February 3, 1992

University of Maryland at College Park, para contactos com o Prof. P. Albrecht e proferir palestra no Department of Civil Engineering, February 6, 1992

7th Annual Technological Literacy Conference, NASTS (National Association for Science, Technology and Society), **Alexandria**, VA, (intervenção de Lester Brown), February 6-9, 1992

Weibull Analysis RMS (reliability, maintainability, safety, supportability)/ ILS Modeling workshop, **Detroit**, Society of Automotive Engineers, February 24-28, 1992

NSF (National Science Foundation) Chautauqua Short Course Program, course 16: Science, Technology and Society: Integrative General Education, Temple University, **Philadelphia**, March 5-7, 1992

Whole Life Expo (10th Anniversary), April 24-26, 1992 Concourse Exhibition Center, **San Francisco**

Media and Democracy: Covering the '92 Elections, a Media Alliance Conference, May 9, 1992, (com a participação de Ralph Nader e de Jerry Brown), **University of San Francisco**

Living Democracy in a Media Age, a Chautauqua Series Advocating Government by the People, (Californians in Dialog for the Common Good), **San Francisco State University**, May 10, 1992

MAC to the Future, May 19, 1992, Hyatt Regency **San Francisco**

visita à empresa Precision Technologies, (realização de entalhes por *edm* e medição de tensões residuais, com o Dr. Weili Cheng), **Livermore**, CA, May 20, 1992

NATO Advanced Study Institute on Concurrent Engineering, University of Iowa, **Iowa City**, May 24 - June 6, 1992

Washington University, Seattle, contactos com o bolseiro do DEMEGI Eng. José Magalhães, com o seu *advisor* Prof. A. Emery, e com o Prof. A. Kobayashi, June 12-17, 1992

visita ao NASA Ames Research Center, **Moffet Field**, CA, June 25, 1992

American Library Association 111th Annual Conference, Moscone Convention Center, **San Francisco**, exhibit, (intervenções de Representative Patricia Schroeder (D-Colo.) e de Gloria Steinem), June 27-30, 1992

diversas visitas a Hibbitt, Karlsson & Sorensen, (ABAQUS), West Coast Office, **Fremont**, CA, (contactos com Dr. N. Rebelo), June 1992

College Management Program, Carnegie Mellon University, **Pittsburgh**, July 6 - July 24, 1992

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Seminários

1ª Parte: Novembro de 1991 - Março de 1992

E. Butler, 'Toughening mechanisms in fiber-reinforced ceramic composites', seminar of the Materials Science and Engineering Department, **Lehigh University**, Nov. 19, 1991

P. Sullivan, 'Engineering skills neccessary for your future', Student Materials Society, Materials Science and Engineering Department, **Lehigh University**, Nov. 21, 1991

A. P. O'Brien, 'Developing the modern manufacturing corporation: the early years at Ford', Department of Economics, Rauch Business Center, **Lehigh University**, Nov. 25, 1991

F. Bradley, 'Computer applications in foundry technology', Department of Materials Science and Engineering, **Lehigh University**, Nov. 26, 1991

E. E. Gdoutos, 'Evaluation of stress intensity factors in crack problems by the method of caustics, limit of applicability of the method', e C. P. Spyropoulos, 'Interaction of the crack tips for the interface problem', seminars at the Institute of Fracture and Solid Mechanics, **Lehigh University**, Nov. 27, 1991

K. J. Meltsner, 'Creating metallurgical expertise and making it accessible to non-metallurgists', seminar by Faculty Candidate at the Department of Materials Science and Engineering, **Lehigh University**, Dec. 12, 1991

K. J. Meltsner, 'Diffusion bonding and related joining methods', seminar by Faculty Candidate at the Department of Materials Science and Engineering, **Lehigh University**, Dec. 13, 1991

P. G. de Gennes, 'Thermodynamics of water soluble polymers', Distinguished Lecture Series on Polymer Interfaces, Polymer Interfaces Center, **Lehigh University**, Jan. 14, 1992

Introduction to Lehigh University Computer Center, **Lehigh University**, Jan. 15, 1992

Remembering Dr. Martin Luther King, Jr, Drown Hall, **Lehigh University**, Jan. 20, 1992

Michael Notis, 'History, Thermodynamics, Phase Diagrams, Phase Transformations, and other Curios', seminar at the Department of Materials Science and Engineering, **Lehigh University**, Jan. 28, 1992

Eric Bogosian, The Visiting Lecturers Committee of Lehigh University, 'Men and Women: Issues in Individuality', Packard Lab. Auditorium, **Lehigh University**, Jan. 29, 1992

P. T. de Castro, 'Mechanics/Materials research at Porto University', seminar at the Department of Civil Engineering, **University of Maryland at College Park**, Feb. 6, 1992 **(palestrante)**

P. T. de Castro, 'Mechanics/Materials research at Porto University', seminar at the Department of Materials Science and Engineering, **Lehigh University**, Feb. 18, 1992 **(palestrante)**

Henry Petroski, ATLSS (Advanced Technology for Large Structural Systems) seminar, **Lehigh University**, Feb. 20, 1992

'The Hidden Genocide of East Timor - Eyewitness Accounts of the November 12, 1991 Massacre' (organização do bolseiro do DEMEGI Eng. J. A. Barros Basto, com a participação de Amy Goodman, Allan Nairn, e the Right Reverend Paul Moore bishop of New York), Rauch Business Center, **Lehigh University**, Mar. 3, 1992 **(*chairperson* da sessão)**

The Reuter Forum: Critical Issues in International Economics, **Columbia University**, Graduate School of Journalism, New York, Mar. 4, 1992

J. West, 'Effective communications in the global workplace', The Center for Manufacturing Systems Engineering, **Lehigh University**, Mar. 13, 1992

2ª Parte: Abril - Julho de 1992

T. Mudrock, 'Market Driven Manufacturing: a Strategy for the Future', Director of Components Planning, INTEL Corp., **U. C. Berkeley**, April 27, 92

meeting on East Timor, 105 Northgate Hall (near Hearst and Euclid) com a participação de alunos da UCBerkeley que participaram na missão do navio Lusitania Express a Timor, **U. C. Berkeley**, April 28, 92

J.-C. Dischamps, 'European Community, International Trade and World Unity', the 45th Barbara Weinstock Lecture on the Morals of Trade, **U. C. Berkeley**, April 30, 92

D. Mowery, 'U.S. Technology Policy in an Open Economy', Tau Beta Pi 1992 Lecture Series on Competitiveness, **U.C. Berkeley**, April 30, 92

'The US-Mexico Free Trade Agreement: Problems & Prospects', roundtable chair - Prof. Vinod Aggarwal (UCBerkeley); participantes: Gustavo Vega, Gustavo del Castillo, Max Cameron, Harley Shaiken, 106 Moffit Hall, **U. C. Berkeley**, May 1, 92

'Distinguished Teaching at UCBerkeley Award Ceremony', Zellerbach Playhouse, **U. C. Berkeley**, May 5, 92

'On Art and Politics', Susan Sontag, City Arts & Lectures, Herbst Theatre, **San Francisco,** May 5, 92

'Israel Security and Palestinian self Determination', Latimer Hall, (marcado para o Moses Hall), **U. C. Berkeley**, May 6, 92

Stephen Juhasz, Sowthwest Research Institute, 'Visuals Seminar & Clinic', Mechanical Engineering Department, **U. C. Berkeley**, May 7, 92

Harris seminar, Joe Scott, Institute of Governmental Studies, Moses Hall, **U. C. Berkeley**, May 8, 92

Beyond the Verdict: Race Relations in the United States, International House Auditorium, **U. C. Berkeley**, May 8, 92

Campus Meeting: Question and Answer Session on Potential State Budget Cuts and their Possible Impacts on UCBerkeley, Dwinelle Hall, **U. C. Berkeley**, June 19, 92 (Vice Chancellor John Heilbron)

P. T. de Castro, 'Mechanics/Materials research at Porto University', seminar at the Department of Mechanical Engineering, **U. C. Berkeley**, June 30, 1992 **(palestrante)**

4

Visitas a estabelecimentos de ensino superior para recolha de informações

1ª Parte da estadia

Georgia Institute of Technology (Atlanta)	3/12
The George Washington University (Washington DC)	6/12
Pennsylvania State University (University Park)	18/12
Princeton University	20/12
Fordham University (New York)	16/1
The Juilliard School (New York)	22/1 + 4/3
New York Institute of Technology	22/1
Hunter College, The City University of New York	22/1
The City University of New York, The Graduate School	22/1
Temple University (Philadelphia)	25/1 + 5/3
New York University	27/1
Fashion Institute of Technology, State University of New York	27/1
New School for Social Research (New York)	27/1
Parsons School of Design, New School of Social Research (New York)	27/1 + 3/2
University of Maryland at College Park	6/2
The University of the Arts (Philadelphia)	13/2 + 5/3
Columbia University (New York)	4/3
The Curtis Institute of Music (Philadelphia)	5/3
Moore College of Art and Design (Philadelphia)	6/3
School of Visual Arts (New York)	12/3
Baruch College, The City University of New York	12/3
Yeshiva University (New York)	12/3 + 19/3

2ª Parte da estadia

University of San Francisco, (San Francisco)	9/5
San Francisco State University (San Francisco)	10/5
Academy of Art College (San Francisco)	May
Golden Gate University (San Francisco)	May
San Francisco Art Institute (San Francisco)	May
The San Francisco School of Art (San Francisco)	May
University of Washington (Seattle)	13-16/6
University of Pittsburgh (Pittsburgh)	July

Além, naturalmente, das instituições objecto de estadias mais demoradas:

Lehigh University, Nov. 91 - Mar. 92
University of California at Berkeley, Apr. - July 92
The University of Iowa, (Iowa City), May 24 - June 6, 92
Carnegie Mellon University, (Pittsburgh), July 6 - 24, 92

5

Museus visitados

Nota: indicam-se sublinhadas as instituições do tipo 'museu de ciência' (e eventualmente 'tecnologia') visitadas. A componente 'tecnologia' é mais marcada nos dois museus de aeronautica (o da Smithsonian Institution em Washington DC, e o de Seattle, vizinho da Boeing), e no Henry Ford Museum de Dearborn. A IBM Gallery of Science and Art de New York é um local de exposições temporárias, apenas algumas das quais tem a ver com ciência e técnica.

The Martin Luther King, Jr. Center for Nonviolent Social Change, Inc., **Atlanta**, Dec. 1, 91

Atlanta Cyclorama, **Atlanta**, Dec. 1, 91

Smithsonian Institution, **Washington DC**, Dec. 7-8, 91

- National Air and Space Museum
- National Museum of Natural History
- National Museum of American History
- National Portrait Gallery
- National Gallery of Art (e exposição 'Circa 1492')
- International Gallery
- National Museum of American Art

Carnegie Hall Museum and tour visit, **New York**, Jan 16, 92

IBM Gallery of Science and Art, **New York**, Jan, 92

Henry Ford Museum & Greenfield Village, **Dearborn**, Michigan, Feb 29

Museum of Modern Art, **New York**, Mar 14-15, 92

The Oakland Museum, **Oakland**, CA, May 13, 92

Ansel Adams Center, **San Francisco**, May 17, 92

The University of Iowa Museum of Art, **Iowa City**, May 30, 92

University Art Museum, University of California at Berkeley, **Berkeley,** June, 1992

Museum of Flight, **Seattle**, June 14, 92

Fallingwater (Frank Lloyd Wright), **Mill Run,** PA, Western Pennsylvania Conservancy, July 18, 92

6

Papers obtidos para apoio a trabalhos em curso ou previstos

ordem alfabética de assuntos:

alumínio
betão reforçado com fibras
caminhos de ferro, LRVs, carris
caminhos de ferro, LRVs, geral
cerâmicos
compósitos, geral
compósitos, fadiga
compósitos, fractura
design, ensino do design
design, 'processos gerais de cálculo'
design, teoria do design
diversos
ensino
fluência
gestão, gestão da I&D
materiais frágeis
Mecânica da Fractura
polímeros
tensões residuais
vidro
Weibull

Alumínio

K T Venkateswara Rao, R O Ritchie, 'Fatigue of aluminium-lithium alloys', submitted to International Materials Reviews, LBL-30176 preprint

K T Venkateswara Rao, R O Ritchie, 'Mechanisms influencing the cryogenic fracture-toughness behavior of aluminium-lithium alloys', Acta Metall Mater, vol.38, (11), pp.2309-2326, 1990

J K Shang, R O Ritchie, 'On the particle-size dependence of fatigue-crack propagation thresholds in SiC-particulate-reinforced aluminium-alloy composites: role of crack closure and crack trapping', Acta Metall Mater, vol.37, (8), pp.2267-2278, 1989

J K Shang, R O Ritchie, 'Crack bridging by uncracked ligaments during fatigue-crack growth in SiC-reinforced aluminium-alloy composites', Metallurgical Transactions A, vol.20A, May 1989, pp.897-908

C R Owen, R J Bucci, R J Kegarise, 'Aluminium quality breakthrough for aircraft structural reliability', Journal of Aircraft, vol. 26, (2), Feb 1989, pp.178-184

G C White, 'Fatigue behavior of (BS1470 N8-0) aluminum alloy and (BS 1501-5100 nickel steel double-fillet and tee-butt welds (subject to bending)', J Testing and Evaluation, vol.20, (3), May 1992, pp.180-189

Betão reforçado com fibras

S P Shah, 'Concrete composites, fiber reinforced', International Encyclopedia of Composites, vol.1, S M Lee, ed., VCH Publishers, 1990, pp..453-469

D J Hannant, D C Hughes, A Kelly, 'Toughening of cement and other brittle solids with fibres', Phil Trans R Soc Lond, A310, pp.175-190, 1983

A J Majumdar, V Laws, 'Composite materials based on cement matrices', Phil Trans R Soc Lond, A310, pp.191-202, 1983

S P Shah, C Ouyang, 'Mechanical behavior of fiber-reinforced cement-based composites', J Am Ceram Soc, vol.74, (11), pp.2727-2738, 2947-2953

Caminhos de Ferro, Carris

S J Wineman, F A McClintock, 'A saw-cutting test for estimating stress intensity at a rail web crack due to residual stresses', Theoretical and Applied Fracture Mechanics, vol.13, 1990, pp.21-27

S J Wineman, F A McClintock, 'Residual stresses near a rail end', Theoretical and Applied Fracture Mechanics, vol.13, 1990, pp.29-37

D Jablonski, Y H Tang, R H Pelloux, 'Simulation of railroad crack growth life using laboratory specimens', Theoretical and Applied Fracture Mechanics, vol.14, 1990, pp.27-36

Y H Tang, A B Perlman, O Orringer, D A Jablonski, 'Comparison of two crack growth rate models with laboratory spectrum and field tests on rail steel', Theoretical and Applied Fracture Mechanics, vol.15, 1991, pp.1-9

Caminhos de Ferro, Geral

D K Ware, R N H Jones, 'Recent developments in light rail systems', Proc Instn Mech Engrs, Part F: Journal of Rail and Rapid Transit, vol.206, 1992, pp.47-65

G H Hafter, 'BOA - the RAPT's new concept for its urban system', Proc Instn Mech Engrs, Part F: Journal of Rail and Rapid Transit, vol.206, 1992, pp.75-78

J R Fowler, 'The use of structural adhesives in the construction of rail vehicles', Proc Instn Mech Engrs, Part F: Journal of Rail and Rapid Transit, vol.205, 1991, pp.131-135

Cerâmicos

R O Ritchie, R H Duaskardt, 'Cyclic fatigue of ceramics: a Fracture Mechanics approach to subcritical crack growth and life prediction', The Centennial Memorial Issue of the Ceramic Society of Japan, pp.1047-1062

R H Dauskardt, M R James, J R Porter, R O Ritchie, 'Cyclic fatigue-crack growth in a SiC-whisker-reinforced ceramic composite: long- and small-crack behavior', J Am Ceram Soc, vol.75, (4), PP.759-771, 1992

R H Dauskardt, D B Marshall, R O Ritchie, 'Cyclic fatigue-crack propagation in magnesia-partially-stabilized zirconia ceramics', J Am Ceram Soc, vol.73, (4), pp.893-903

R H Dauskardt, W C Carter, D K Veirs, R O Ritchie, 'Transient subcritical crack-growth behavior in transformation-toughned ceramics', Acta Metall. Mater., vol.38, (11), pp.2327-2336, 1990

A A Steffen, R H Dauskardt, R O Ritchie, 'Cyclic fatigue life and crack-growth behavior of microstructurally small cracks in magnesia-partially stabilized zirconia ceramics', J Am Ceram Soc, vol.76, (6), June 1991, pp.1259-1268

A G Evans, 'Perspective on the development of high-toughness ceramics', J Am Ceram Soc, 73 (2), pp.187-206, 1990

T Fett, D Munz, 'Why can microcracks in ceramics propagate at extremely low stress intensity factors?', J Mater Sci Letters, vol.11, pp.257-2660, 1992

Compósitos, Geral

anon., 'Standardized testing of advanced composites', Advanced Materials & Processes, (2), 1991, pp.52-54

T W Eagar, 'Whither advanced materials', Advanced Materials & Processes, (6), 1991, pp.25-29

J R Vinson, 'Recent advances in technology for composite materials in the United States', J Composites Tech & Research, vol. 7, (2), 1985, pp.59-64

K R Quinn, C A Carreno, 'High-temperature thermoplastic composites', Advanced Materials & Processes, (8), 1991, pp.25-31

V K Srivastava, S Lal, 'Mechanical properties of E-glass fibre reinforced nylon 6/6 resin composites', J Materials Science, vol.26, 1991, pp.6693-6698

Compósitos, Fadiga

R Talreja, 'A conceptual framework for the interpretation of fatigue damage mechanisms in composite materials', J Composites Tech & Research, vol. 7, (1), 1985, pp.25-29

K K Chawla, 'Fatigue', International Encyclopedia of Composites, vol.2, S M Lee, ed., VCH Publishers, 1990, pp.107-116

A Rotem, 'Fatigue, Stiffness', International Encyclopedia of Composites, vol.2, S M Lee, ed., VCH Publishers, 1990, pp.127-134

Compósitos, Fractura

R J Nuismer, J D Labor, 'Applications of the average stress failure criterion: part I - tension', J Composite Materials, vol. 12, July 1978, pp.238-249

R J Nuismer, J D Labor, 'Applications of the average stress failure criterion: part II - compression', J Composite Materials, vol. 13, Jan 1979, pp.49-60

W S Johnson, P D Mangalgiri, 'Investigation of fiber bridging in double cantilever beam specimens', J Composites Tech & Research, vol.9, (1), 1987, pp.10-13

J D Whitcomb, 'A simple calculation of strain-energy release rate for a nonlinear double cantilever beam', J Composites Tech & Research, vol. 7, (2), 1985, pp.64-66

P E Keary, L B Ilcewicz, C Shaar, J Trostle, 'Mode I interlaminar fracture toughness of composites using slender double cantilevered beam specimens', J Composite Materials, vol.19, March 1985, pp.154-177

B D Agarwal, 'Fracture toughness of fiber-reinforced composites', Handbook of Ceramics and Composites, vol.1: Synthesis and Properties, N P Cheremisinoff, ed., Marcel Dekker, pp.269-305

J M Whitney, 'Fracture, interlaminar', International Encyclopedia of Composites, vol.2, S M Lee, ed., VCH Publishers, 1990, pp.289-306

S L Donaldson, S Mall, C Lingg, The split cantilever beam test for characterizing mode III interlaminar fracture toughness', J Composites Technology and Research, vol.13, (1), 1991, pp.41-47

W Bradley, 'The role of matrix properties on the toughness of thermoplastic composites', in: L. A. Carlsson, ed., 'Thermoplastic composite materials', Elsevier Science Pub, 1991, pp.295-329

Z Suo, G Bao, B Fan, 'Delamination R-curve phenomena due to damage', J Mech Phys Solids, vol.40, (1), pp.1-16, 1992

J M Whitney, 'Analysis of the end notch flexure specimen using a higher order beam theory based. on Reissner's principle', Proceedings of the American Society for Composites, 3rd Technical Conference, (held Sept. 25-29, 1988, Seattle), Technomic, pp.103-112

R H Martin, 'Effect of initial delamination on C_{Ic} and G_{Ith} values from glass/epoxy double cantilever beam tests', Proceedings of the American Society for Composites, 3rd Technical Conference, (held Sept. 25-29, 1988, Seattle), Technomic, pp.688-700

Design, Ensino

D L Evans, B W McNeill, G C Beakley, 'Design in engineering education: past views of future directions', Engineering Education, Jul-Aug 1990, pp.517-522

M Tribus, 'Afterthoughts from a found(er)ing father', Engineering Education, Jul-Aug 1990, pp.523-525

J H McMasters, S D Ford, 'An industry view of enhancing design education', Engineering Education, Jul-Aug 1990, pp.526-529

C R Peterson, 'The desegregation of design', Engineering Education, Jul-Aug 1990, pp..530-532

R S Culver, D Woods, P Fitch, 'Gaining professional expertise through design activities', Engineering Education, Jul-Aug 1990, pp.533-536

D Muster, F Mistree, 'Issues in engineering design research', Engineering Education, Dec 1990, pp.1014-1016

M Sansalone, 'Teaching structural concepts through case studies and competitions', Engineering Education, May-Jun 1990, pp.472-475

J O'Leary, (editor), 'Editorial: Mentors and heroes', Mechanical Engineering, Jan 1991, p.2

vários, 'Letters: 'Mentors: past and present", Mechanical Engineering, Mar 1991, p.6

J O'Leary, 'Editorial: Wrestling with design', Mechanical Engineering, Feb 1991, p.2

J R Dixon, 'Engineering design science: The state of education', Mechanical Engineering, Feb 1991, pp.64-67

J R Dixon, 'Engineering design science: new goals for engineering education', Mechanical Engineering, Mar 1991, pp.56-62

vários, 'Letters: Design Education', Mechanical Engineering, Apr 1991, p.6

vários, 'Letters: Is design an art?' Mechanical Engineering, May 1991, pp.6&20

vários, 'Letters: Freedom of design', Mechanical Engineering, Jun 1991, p.6

D P Scotto, 'Letters: 'The two stigmata", Mechanical Engineering, Jul 1991, p.6

vários, 'Letters: 'Design science" (contem réplica de J R Dixon), Mechanical Engineering, Aug 1991, pp.6&74

D G Wilson, E E Blanco, 'EDICS: a multimedia tutor for engineering design', Mechanical Engineering, Oct 1991, pp.74-79

J O'Leary (ed.itor), 'Editorial: bypassing the box canyon' (on J R Dixon's articles on design), Mechanical Engineering, Jan 1992, p.2

Design, 'Processos gerais de cálculo', (histórico)

O J Horger, 'Design of press- and shrink-fitted assemblies, Part I', ASME, Design Data and Methods: Applied Mechanics, 1953, pp.82-86

O J Horger, C W Nelson, 'Design of press- and shrink fitted assemblies, Part II', ASME, Design Data and Methods: Applied Mechanics, 1953, pp.87-91

C R Soderberg, 'Working stresses', ASME, Design Data and Methods: Applied Mechanics, 1953, pp.92-94

T Ranov, F R Park, 'On the maximum numerical value of the tangencial stress in thick-walled cylinders', ASME, Design Data and Methods: Applied Mechanics, 1953, pp.97-100

Design, Teoria do

D E Whitney, 'Designing the design process', Res Eng Des, vol.2, 1990, pp.3-13

S Finger, J R Dixon, 'A review of research in mechanical engineering design. Part I: descriptive, prescriptive, and computer-based models of design processes', Res Eng Des, vol.1, 1989, pp.51-67

S Finger, J R Dixon, 'A review of research in mechanical engineering design. Part II: representations, analysis, and design for the life cycle', Res Eng Des, vol.1, 1989, pp.121-137

anon, 'Research review: The engineering design research center', Carnegie Mellon University', Res Eng Des, vol.1, 1989, pp.139-143

anon, 'Research review: The Darmstadt computer graphics triad', Res Eng Des, vol.1, 1990, pp.239-241

F Bauert, W Beitz, E Weise, N Salem, 'Modeling methods for a flexible computer-aided embodiment design system', Res Eng Des, vol.2, 1990, pp.15-34

F Mistree, 'Book review: 'Principles of Design' ', N P Suh, Res Eng Des, 1992, vol.3, pp.243-246

P Treacy, J B Ochs, T M Ozsoy, N Wang, 'Automated tolerance analysis for mechanical assemblies modeled with geometric features and relational data structure', Computer-Aided Design, vol.23, (6), Jul-Aug 1991, pp.444-453

Diversos

Lawrence Berkeley Laboratory, CAM (Center for Advanced Materials) Annual Report 1989, LBL-28495, UC-404 (DoE contract DE-AC03-76SF00098)

Materials Sciences Division, 1990 Annual Report (National Center for Electron Microscopy; Physics, Chemistry and Materials Sciences; Center for Advanced Materials), LBL-31510, UC-404

D A Bromley, 'Comment: Opportunities in materials science and engineering: the US government response', Materials & Design, vol.13, (1), Feb. 1992, pp.43-45

N Rebelo, J C Nagtegaal, L M Taylor, R Passmann, 'Comparison of implicit and explicit finite element methods in the simulation of metal forming processes' manuscrito para publicação, 1992

C Archer, 'Product reliability assurance - an overview', Proceedings of the 2nd Conf on Materials Engineering, 5-7 November 1985, London, pp.113-116

D J Berry, 'Materials testing using non-contacting stress mapping techniques', Proceedings of the 2nd Conf on Materials Engineering, 5-7 November 1985, London, pp.127-134

P Peng, C T Byrne, C C Hanninen, G A Miller, 'Thermal cycling of surface mount technology (SMT) and J-lead (J) electrical solder (63/37 wt% Sn/Pb) joints', apresentado em Materiais 91, 5º Encontro Nacional da SPM, Lisboa, 6-8 Nov 1991

C T Sims, 'Non metallic materials for gas turbine engines: are they real?', Advanced Materials & Processes, (6), 1991, pp.32-39

NIST, Manufacturing Technology Centers Program - Applicant's information packet, January 1992

US Department of Energy, Office of Civilian Radioactive Waste Management, 'Annual Report to Congress', DOE/RW-0299P, Dec. 1990

US Department of Energy, Office of Civilian Radioactive Waste Management, 'Annual Report to Congress', DOE/RW-0335P, March 1992

US Department of Energy, 'Spent fuel syorage at the monitored retrievable storage facility', DOE/RW-0324P

US Department of Energy, Office of Civilian Radioactive Waste Management, 'A monitored retrievable storage faciliyty: technical background information', DOE/RW-0311P, July 1991

US Department of Energy, Office of Civilian Radioactive Waste Management, 'Site characterization progress report: Yucca Mountain, Nevada', DOE/RW-0307P-4, Oct. 1991

US Department of Energy, Office of Civilian Radioactive Waste Management, 'Progress report on the scientific investigation program for Nevada Yucca mountain site', DOE/RW-0292P, Nov. 1990

US Department of Energy, Office of Civilian Radioactive Waste Management, 'Site characterization plan overview', DOE/RW-0198, Dec. 1988

US Department of Energy, 'DOE's Yucca mountain studies', DOE/RW-0293P, Dec. 1990

The League of Women Voters Education Fund, 'The nuclear waste primer', Nick Lyons Books, 1985

Ensino

R W Schmitt, 'Universities of the Future', Research, Technology Management, Sep-Oct 1989, pp.18-23

T E Downing, L C Schooley, E M Matz, L N Nelson, R Martinez, 'Improving instructor/student interaction with electronic mail', Engineering Education, Jan 1988, pp.247-250

R N Ostling, 'Big chill on campus', Time, Feb 3, 1992, pp.61-63

an., 'Testing and grading: faculty practices and opinions', Bureau of Evaluative Studies and Testing, Indiana Studies in Higher Education, number 51, Indiana University, April 1984

an., 'University faculty and students' opinions of student ratings', Bureau of Evaluative Studies and Testing, Indiana Studies in Higher Education, number 55, Indiana University, November 1987

L R Barrett, 'On the training of academics and graduate study in England', Higher Education Review, vol.22, (3), 1990, pp.63-67

G P O'Neill, 'Publish or perish: dispelling the myth', Higher Education Review, vol.22 (3), 1990, pp.55-62

R W Harris, 'The CNAA, accreditation and quality assurance', Higher Education Review, vol.22 (3), 1990, pp.34-54

G Johnes, 'Bidding for students in Britain - why the UFC auction 'failed' ', Higher Education, vol.23, pp.173-182, 1992

D Turner, J Pratt, 'Bidding for funds in higher education', Higher Education Review, vol.22 (3) 1990, pp.19-33

H R Kells, 'Purposes and means in higher education evaluation', Higher Education Management, March 1992, vol.4, (1), pp.91-102

an., editorial, Higher Education Review, vol.23 (1), 1990, pp.3-6

K J Gregory, 'Assessing departmental academic performance: a model for a UK university', Higher Education Review, vol.23 (2), 1991, pp.48-60

T Bourner, M Hughes, 'Joint supervision of research degrees: second thoughts', Higher Education Review, vol.24 (1), 1991, pp.21-34

W H Gmelch, J B Carroll, 'The three Rs of conflict management for department chairs and faculty', Innovative Higher Education, vol.16, (2), 1991, pp.107-123

A H Franke, 'Legal watch: Politics, law, and lesbian and gay faculty', Academe, Bulletin of the American Association of University Professors, vol.78, (2), Mar-Apr 1992, p.100

B R Bergmann, 'Bloated administration, blighted campuses', Academe, Bulletin of the American Association of University Professors, Nov-Dec 1991, pp.12-16

J A Halfond, 'How to control administrative cost', Academe, Bulletin of the American Association of University Professors, Nov-Dec 1991, pp.17-19

M L Skolnik, G A Jones, 'A comparative analysis of arrangements for state coordination of higher Education in Canada and the United States', Journal of Higher Education, vol.63, (2), Mar-Apr 1992, pp.121-142

P D Isaac, S V Quinlan, M M Walker, 'Faculty perceptions of the doctoral dissertation', Journal of Higher Education, vol.63, (3), May-Jun 1992, pp.241-268

H Mathias, 'The role of the university head of department', Journal of Further and Higher Education, vol.15, (3), Autumn 1991, pp.65-75

P E Barton, 'The school-to-work transition - How to bridge the gap that separates new high school graduates from good jobs', Issues in Science and Technology (National Academy of Sciences), Spring 1991, pp.50-54

L Thurgood, A B Flannery, '(Real Numbers:) Foreign Passports, U. S. doctorates', Issues in Science and Technology (National Academy of Sciences), Spring 1991, pp.86-87

S H Cutcliffe, 'The STS curriculum: what have we learned in twenty years?', Science, Technology and Human Values, vol.15, (3), Summer 1990, pp.360-372

M L S (editor), 'Editorial' (on the white paper 'Higher Education: a New Framework'), Higher Education Quarterly, vol.45, (3), Summer 1991, pp.201-203

P Swinnerton-Dyer, 'Policy on higher education and research: the Rede lecture 1991', Higher Education Quarterly, vol.45, (3), Summer 1991, pp.204-218

A G Hoare, 'Reviewing the reviews: the geography of university rationalisation', Higher Education Quarterly, vol.45, (3), Summer 1991, pp.234-253

Lord Beloff, 'Reviews: Beginnings' review of the book 'Begin here... the forgotten conditions of teaching and learning', J Barzun), Higher Education Quarterly, vol.45, (3), Summer 1991, pp.267-270

anon, 'Editorial', Higher Education Quarterly, vol.45, (2), Spring 1991, pp.115-116

C Ball, 'The merging of the PCFC and the UFC: probable, desirable or inevitable?', Higher Education Quarterly, vol.45 (2), Spring 1991, pp.117-124

M L S (editor), 'Editorial' (on the role of the market in higher Education), Higher Education Quarterly, vol.45, (1), 1991, pp.1-3

A Howarth, 'Market forces in higher education', Higher Education Quarterly, vol.45, (1), 1991, pp.5-13

J Ziman, 'Academic science as a system of markets', Higher Education Quarterly, vol.45, (1), Winter 1991, pp.41-61

anon, 'Fact file: foreign students in U.S. institutions, 1990-91', The Chronicle of Higher Education, Oct. 23, 1991, p.A41

anon, 'Fact file: Recipients of doctorates from U.S. universities, 1990', The Chronicle of Higher Education, Oct.16, 1991, p.A20

N Stone, 'Does business have any business in education?', Harvard Business Review, Mar-Apr 1991, pp.46-62

anon, 'Summary of the report on evaluation of engineering education', J Engineering Education, Sep 1955, p.25

anon, 'Report of the committee on evaluation of engineering education', J Engineering Education, Sep 1955, pp.26-60

anon, 'Report of the committee on ethics', J Engineering Education, Sep 1955, pp.61-63

B H Sheahan, J A White, '*Quo vadis* undergraduate engineering education?', Engineering Education, Dec 1990, pp.1017-1022

J R Lohmann, 'Myths, facts, and the future of U.S. engineering education', Engineering Education, Apr 1991, pp.365-371

J L Merian, 'The decline of academic standards', Engineering Education, May-Jun 1991, pp.405-407

E A McBean, 'Analyses of teaching and course questionnaires: a case study', Engineering Education, May-Jun 1991, pp.439-441

D Q Fletcher, 'Does ABET live up to its acronym?', Engineering Education, May-Jun 1990, pp.450-453

vários, 'Responses: 'Does ABET do its job well?' ', Engineering Education, Jul-Aug 1990, pp.512-515

A Collins, 'Quality control as a model for Education: it would improve our output', Engineering Education, May-Jun 1990, pp.470-471

R H Bube, 'Expectation vs. reality in engineering faculty careers', Engineering Education, Jan-Feb 1990, pp.33-36

F Beaufait, 'Planning for tenure and promotion: be your own coach', Engineering Education, Jan-Feb 1990, pp.31-32

M H Kaplan, 'Funded research: getting started', Engineering Education, Jan-Feb 1990, pp.27-30

R G Griskey, 'The interrelationship of faculty, research funds, and doctoral degrees', Engineering Education, Jan-Feb 1990, pp.23-26

J G Bollinger, 'Strategic planning in an academic environment', Engineering Education, Jan-Feb 1990, pp.19-22

M L Matyas, S M Malcom, eds., 'Investing in human potential: Science and Engineering at the crossroads', executive summary, AAAS American Sosiety for the Advancemente of Science, 1991

Fluência

H Yin, M Gao, R P Wei, 'Deformation and subcritical crack growth under static loading', Materials Science and Engineering, vol. A119, 1989, pp.51-58

E L Robinson, 'Safety margins and stress levels in high temperature equipment', Transactions of the ASME, 1951, vol.73, pp.89-99

R Viswanathan, 'Residual life techniques for plant life extension', Materials Science and Engineering, A103, 1988, pp.131-139

G A Miller, A R Marder, S D Holt, H R Voorhees, 'Creep-fatigue interaction in T11 boiler tube steel', J Testing and Evaluation, vol. 19, (6), Nov. 1991, pp.485-492

Gestão, Gestão da I&D

anon, 'Editorial: Research and Educational characteristics of the engineering management discipline', IEEE Transactions on Engineering Management, vol.37, (3), Aug 1990, pp.172-176

'Interdisciplinary engineering research: a case study', Interview with R B Pipes, Engineering Education, Oct 1987, pp.19-22

J Bordogna, W F Hamilton, M J Stephens, 'Linking management and technology - a decade's experience', Engineering Education, Oct 1987, pp.23-28

N P Suh, 'The ERCs: what we have learned', Engineering Education, Oct 1987, pp.16-18

I Wilson, 'The state of strategic planning: what went wrong? what goes right?', Technological Forecasting and Social Change, vol.37, 1990, pp.103-110

H Petroski, S Kayello, 'Measures and mismeasures of the Applied Mechanics literature', Technological Forecasting and Social Change', vol.31, 1987, pp.323-333

P H Francis, 'Quality in R&D: Putting quality into the R&D process', Research, Technology Management, Jul-Aug 1992, pp.16-23

R D Wismer, '(Managers at work:) Making an effective technical presentation', Research, Technology Management, Jul-Aug 1989, pp.9-10

K J Hladik, L H Linden, 'Is an international joint venture in R&D for you?', Research, Technology Management, Jul-Aug 1989, pp.11-13

C J Bishop, '(Managers at work:) Selling your R&D ideas', Research, Technology Management, Mar-Apr 1989, pp.6-7

K W McHenry, 'Five miths of industry/university cooperative research - and the realities', Research, Technology Management, May-Jun 1990, pp.40-42

M F Wolff, '(Managers at work:) How am I doing?', Research, Technology Management, May-Jun 1990, pp.9-10

M Maccoby, '(The human side:) How to be a quality leader', Research, Technology Management, Sep-Oct 1990, pp.51-52

L M Branscomb, 'Does America need a technology policy?', Harvard Business Review, Mar-Apr 1992, pp.24-31

vários, 'Technology policy: is America on the right track?', Harvard Business Review, May-Jun 1992, pp.140-157 (comentários ao artigo anterior, e réplica de L M Branscomb)

R Florida, M Kenney, 'Silicon valley and route 128 won't save us', California Management Review, Fall 1990, pp.68-88

D Mowery, 'US technology policy in an open economy' (lecture at the Bechtel Engineering Center, University of California at Berkeley), April 30, 1992

S Aryee, 'Career orientationsm perceptions of rewarded activity, and career strategies among R&D professionals', J Engng Tech Management, vol.9, pp.61-82, 1992

L Bailyn, 'The hybrid career: an exploratory study of career routes in R&D', J Engng Tech Management, vol.8, pp.1-14, 1991

E Corcoran, 'Trends in industrial research: redesigning research', Scientific American, June 1992, pp.103-110

an.,'Industrial R&D wins political favor', Science, vol.255, pp.1500-150

G R Heaton, Jr, 'Global technology policy: is the United States ready?', Issues in Science and Technology (National Academy of Sciences), vol. 8, (1), Fall 1991, pp.36-43

L M Branscomb, 'Toward a U.S. technology policy', Issues in Science and Technology (National Academy of Sciences), Summer 1991, pp.50-55

P R Reid, '(Real Numbers:) The globalization of technology', Issues in Science and Technology (National Academy of Sciences), Summer 1991, pp.92-93

D Kleppner, '(The ending frontier:) The Leaderman report and its critics', Issues in Science and Technology (National Academy of Sciences), Spring 1991, pp.32-34

R M White, '(The ending frontier:) Too many researchers, too few dollars', Issues in Science and Technology (National Academy of Sciences), Spring 1991, pp.35-37

J F Welch, Jr, 'Restoring upward mobility', Issues in Science and Technology (National Academy of Sciences), Spring 1991, pp.38-40

W R Grogan, 'The american engineer as policymaker', Issues in Science and Technology (National Academy of Sciences), Spring 1991, pp.40-42

J Werner, J Bremer, 'Hard lessons in cooperative research - Learning from the disappointing experiments of the 1980s can help build effective consortia in the 1990s', Issues in Science and Technology (National Academy of Sciences), Spring 1991, pp.44-49

R Hoffmann, 'Why scientists shouldn't run the world', Issues in Science and Technology (National Academy of Sciences), Winter 1990-1991, pp.38-39

R B Reich, 'Does corporate nationality matter?', Issues in Science and Technology (National Academy of Sciences), Winter 1990-1991, pp.40-44

A Schriesheim, 'Toward a golden age for technology transfer', Issues in Science and Technology (National Academy of Sciences), Winter 1990-1991, pp.52-58

J C Vaughn, R M Rosenzweig, 'Heading off a Ph.D. shortage', Issues in Science and Technology (National Academy of Sciences), Winter 1990-1991, pp.66-73

J B Tucker, 'Science and technology in a united Germany', Issues in Science and Technology (National Academy of Sciences), Winter 1990-1991, pp.74-81

I Inkster, 'Science, technology and economic development - Japanese historical experience in context', Annals of Science, vol.48, 1991, pp.545-563

J R Hann, 'Development management strategies for RD&A programs: improving produtivity and efficiency', Army Research, Development & Acquisition Bulletin, Sept-Oct 1991, pp.16-19

J A Ball 'Technology transfer - it's the law', Army Research, Development & Acquisition Bulletin, Nov-Dec 1991, pp.8-10

C A Widmaier, 'ETDL inventor receives $10000 from patent fees', Army Research, Development & Acquisition Bulletin, Nov-Dec 1991, pp.11-12

Book Reviews: 'Made in America - Regaining the productive edge', M L Dertouzos, R K Lester R M Solow, reviewd by A M Khan, IEEE Transactions on Engineering Management, vol.37, (3), Aug 1990, P.233

Book Reviews: 'Made in America - Regaining the productive edge', M L Dertouzos, R K Lester R M Solow, reviewed by A K Chakrabarti, IEEE Transactions on Engineering Management, vol.37, (3), Aug 1990, pp.234-235

Book Reviews: 'The competitive advantage of nations', M E Porter, reviewed. by A M Khan, IEEE Transactions on Engineering Management, vol.39, (1), Aug 1992, pp.97-98

S Sandeerson, 'Where the excellence is: an *Across the Board* interview with Michael E. Porter of the Harvard Business School', IEEE Engineering Management Review, June 1988, vol.16 (2), pp.54-60

D F Kocaoglu, 'Editorial: Toward a paradigm for engineering and technology management', IEEE Transactions on Engineering Management, vol.37, (2), May 1990, pp.77-78

C Giffi, A V Roth, G M Seal, 'Manufacturing technologies: Investment and realization', IEEE Engineering Management Review, vol.19, (1), Spring 1991, pp.25-33

J McCullough, 'First comprehensive survey of NSF applicants focuses on their concerns about proposal review', Science Technology and Human Values, vol.14, (1), Winter 1989, pp.78-102 (incluindo comentários por diversos autores)

G D L Travis, H M Collins, 'New light on old boys: cognitive and institutional particularism in the peer review system', Science, Technology and Human Values, vol.16, (3), Summer 1991, pp.322-341

R S Rosenbloom, M A Cusumano, 'Technological pioneering and competitive advantage: the birth of the VCR industry', California Management Review, vol. 29, (4), Summer 1987, p.51

US General Accounting Office, 'Foreign technology: federal processes for collection and dissemination', GAO/NSIAD-92-101, March 1992

US General Accounting Office, 'Management practices: US companies improve performance through quality efforts', GAO/NSIAD-91-190, May 1991

National Science Foundation, 'Directory of awards - fiscal year 1989-1990', NSF 91-66

National Science Foundation, 'Strategic manufacturing initiative - announcement', 1992

National Science Foundation, 'Career access opportunities in Science and Technology', NSF 90-126, 1991

National Science Foundation, 'Research in undergraduate institutions', NSF 89-60

National Science Foundation, 'Research experiences for undergraduates', NSF 90-79, 1990

National Science Foundation, 'Grants for research and education in Science and Engineering - an application guide', NSF 90-77, Aug. 1990

National Science Foundation, 'Small business innovation research', NSF 91-20, 1991

National Science Foundation, 'Program descriptions', NSF 90-111, 1990

US Air Force Office of Scientific Research, 'Research interests of the Air Force Office of Scientific Research', AFOSR pamphlet 70-1, 1991

Materiais frágeis

Y W Mai, B R Lawn, 'Crack stability and toughness characteristics in brittle materials', Ann Rev Mater Sci, 1986, pp.415-439

P M Braiden, 'The development of rational design criteria for brittle materials', Materials in Engineering, vol.2, Dec 1980, pp.73-82

Mecânica da Fractura

L Banks-Sills, 'Application of the finite element method to linear elastic fracture mechanics', Appl Mech Rev, vol.44, (10), Oct 1991, pp.447-461

F D d'Almeida, R M Guedes, 'The least squares method Applied to a Fracture Mechanics problem', Linear Algebra and its Applications, vol.170, June 1992, pp.169-176

W V Vaidya, 'Fatigue threshold regime of a low alloy ferritic steel under closure-free testing conditions: Part I - compliance variations in the threshold regime', J Testing Evaluation, vol.20, (3), May 1992, pp.157-167

W V Vaidya, 'Fatigue threshold regime of a low alloy ferritic steel under closure-free testing conditions: Part II - hysteresis in near-threshold fatigue crack propagation: an experimental assessment, J Testing Evaluation, vol.20, (3), May 1992, pp.168-179

J A Joyce, R Smudz, 'Evaluation of elastic stress intensity using J-integral specimen geometries', J Testing Evaluation, vol.20, (1), Jan 1992, pp.1-5

S Bhattacharya, A N Kumar, 'Crack tip opening displacement (CTOD) toughness evaluation by ASTM E 1290 and BS5762: a comparative analysis', J Testing Evaluation, vol.20, (2), Feb 1992, pp.99-105

R K Pandey, P Sundaram, A N Kumar, 'Critical assessment of methods for J_{Ic} determination', J Testing Evaluation, vol.20, (2), Feb 1992, pp.106-113

P E Irving, 'Fatigue life assessment and materials engineering', Proceedings of the 2nd Conf on Materials Engineering, 5-7 November 1985, London, pp.117-125

V Weiss, 'Fracture Mechanics 1975 - an overview', in: Application of Fracture Mechanics to Design', J J Burke, V Weiss, eds., Plenum Press, (22nd Sagamore Army Materials Research Conference Proceedings), pp.1-22

J G Kaufman, 'Fracture toughness testing', in: 'Application of Fracture Mechanics to Design', J J Burke, V Weiss, eds., Plenum Press, (22nd Sagamore Army Materials Research Conference Proceedings), pp.23-42

R A Smith, 'An introduction to Fracture Mechanics for engineers. Part I: stresses due to notches and cracks', Materials in Engineering Applications, vol.1, Dec 1978, pp.121-128

R O Ritchie, 'Mechanisms of fatigue crack propagation in metals, ceramics and composites: role of crack tip shielding', Materials Science and Engineering, A103, 1988, pp.15-28

K T Venkateswara Rao, G R Odette, R O Ritchie, 'On the contrasting role of ductile phase reinforcements in the fracture toughness and fatigue-crack propagation behavior of TiNb/g - TiAl intermetallic matrix composites', Acta Metall Mater, vol.40, (2), pp.353-361, 1992

K T Venkateswara Rao, W O Soboyejo, R O Ritchie, 'Ductile-phase toughning and fatigue-crack growth in Nb-reinforced molybdenum dislicide intermetallic composites', report UCB/R/91/A1073, submitted to Metallurgical Transactions A

L Murugesh, K T Venkateswara Rao, L C DeJonghe, R O Ritchie, 'Fracture and fatigue behavior in Nb3Al+Nb intermetallic composites', report UCB/R/92/A1081, to appear in Intermetallic Matrix Composites II, proceedings of the 1992 MRS Spring Meeting, San Francisco

L H Edelson, R O Ritchie, 'Microstructural characterization of a_2+B2 titanium aluminide intermetallic (super a_2) using transmission electron microscopy', Materials Science and Engineering, A103, 1990, pp.193-203

G C Sih, C K Chao, 'Fatigue failure initiation analysis of wing/fuselage bolt assembly', Theoretical and Applied Fracture Mechanics, vol.11, 1989, pp.109-120

G C Sih, Y D Lee, 'Review of triaxial crack border stress and energy behavior', Theoretical and Applied Fracture Mechanics, vol.12, 1989, pp.1-17

G C Sih, D Y Jeong, 'Fatigue load sequence effect ranked by critical available energy density', Theoretical and Applied Fracture Mechanics, vol.14, 1990, pp.141-151

G C Sih, D M Chou, 'Nonequilibrium thermal/mechanical response of 6061 aluminium alloy at elevated temperature', Theoretical and Applied Fracture Mechanics, vol.12, 1989, pp.19-31

P Albrecht, X Chen, J Joyce, 'Limit pressure analysis of PTSE-2 vessel', final report submitted to Oak Ridge National Laboratory, January 1992

J M Hu, P Albrecht, 'Analysis of deformation behavior during plastic fracture', ASTM STP 1114, 1991, pp. 178-196

J M Hu, P Albrecht, 'Limit load solution and loading behavior of C(T) fracture specimens', International Journal of Fracture, vol.512, pp.19-45, 1991

J M Hu, P Albrecht, 'Plastic n and g factors for compact tension specimen in J-integral estimation', J Testing and Evaluation, vol.19, (2), March 1991, pp.160-171

J M Hu, P Albrecht, J Joyce, 'Load ratio method for estimating crack extension', 22nd National Symposium on Fracture Mechanics

A Zahoor, 'Ductile Fracture Handbook', 1st vol., NP-6301-D, N14-1, Research Project 1757-69, June 1989, prepared for NOVOTECH Corp. and EPRI

T Kobayashi, D A Shockey, 'FRASTA: A new way to analyse fracture surfaces', Advanced Materials & Processes, (11), 1991, pp.28-34

T Kobayashi, D A Shockey, 'Fracture analysis via FRASTA', Advanced Materials & Processes, (12), 1991, pp.24-32

Y -Y Wang, D M Parks, W R Lloyd, W G Reuter, J Epstein, 'Elastic-plastic deformation in surface-cracked plates: experiment and numerical analysis, J Applied Mechanics, vol.58, Dec. 1991, pp.895-903

S Ashley, 'Powder-metal forging: Connecting rods that crack by design', Mechanical Engineering, Feb. 1991, pp.54-56

J Toribio, V Sanchez-Galvez, M A Astiz, 'Stress intensification in cracked shank of tightened bolt', Theoretical and Applied Fracture Mechanics, vol.15, 1991, pp.85-97

H W Liu, 'A review of fatigue crack growth analysis', Theoretical and Applied Fracture Mechanics, vol.16, 1991, pp.91-108

Polímeros

F J Lockett, 'A review of polymer property data initiatives', Materials & Design, vol.13, (2), 1992, pp.71-76

C A Paton, S Hashemi, 'Plane-stress essential work of ductile fracture for polycarbonate', J Mater Sci, vol.27, pp.2279-2290, 1992

Tensões residuais

W Cheng, I Finnie, 'An overview of the crack compliance method of residual stress measurement'

W Cheng, G Stevick, I Finnie, 'Predictions of the stress intensity factor for an internal circunferential crack at a butt-weld between cylinders using the plane strain solution', J Engng Materials and Technology, Jan.1984, vol.106, pp.21-24

W Cheng, I Finnie, 'On the prediction of stress intensity factors for axisymmetric cracks in thin-walled. cylinders from plane strain solutions', J Engng Materials and Technology, July 1985, vol.107, pp.227-234

W Cheng, I Finnie, 'A method for measurement of axisymmetric axial residual stresses in circunferentially welded thin-walled cylinders', J Engng Materials and Technology, July 1985, pp.181-185

W Cheng, I Finnie, 'Determination of stress intensity factors for partial penetration axial cracks in thin-walled cylinders', J Engng Materials and Technology, vol.108, April 1986, pp.83-86

W Cheng, I Finnie, 'Measurement of residual hoop stresses in cylinders using the compliance method', J Engng Materials and Technology, April 1986, vol.108, pp.87-92

W Cheng, I Finnie, 'Examination of the computational model for the layer-removal method for residual-stress measurement', Experimental Mechanics, June 1986, pp.150-153

W Cheng, I Finnie, 'A new method for measurement of residual axial stresses applied to a multi-pass butt-welded cylinder', J Engng Materials and Technology, Oct. 1987, vol.109, pp.337-342

W Cheng, I Finnie, 'K_I solutions for an edge-cracked strip', Engng Fracture Mechanics, vol.31, (2), pp.201-207, 1988

W Cheng, I Finnie, 'Stress intensity factors for radial cracks in circular cylinders and other simply closed cylindrical bodies', Engng Fracture Mechanics, vol.32, (3), pp.767-774, 1989

W Cheng, I Finnie, 'K_{II} solutions for an edge-cracked strip', Engng Fracture Mechanics, vol.36, (2), pp.335-360, 1990

W Cheng, I Finnie, 'The crack compliance method for residual stress measurement' *('management')*, Welding in the World, vol.28, (5/6), pp.103-110, 1990

W Cheng, I Finnie, O Vardar, 'Measurement of residual stresses near the surface using the crack compliance method', J Engng Materials and Technology, April 1991, vol.113, pp.199-204

W Cheng, I Finnie, 'An experimental method for determining residual stresses', in: Modelling of Casting, Welding and Advanced Solidification Processes V, ed. by M Rappaz, M R Ozgu and K W Mahin, The Minerals, Metals and Materials Society, 1991, pp.245-252

W Cheng, I Finnie, O Vardar, 'Deformation of an edge-cracked strip subjected to normal surface traction on the crack faces', Engng Fracture Mechanics,

W Cheng, I Finnie, O Vardar, 'Estimation of axisymmetric residual stresses in a long cylinder', JENT 92-1

W Cheng, I Finnie, 'Deformation of an edge-cracked strip subjected to an arbitrary shear surface traction on the crack faces'

W Cheng, I Finnie, 'Measurement of residual stress distribution near the toe of a weld between a bracket and a plate using the crack compliance method'

W Cheng, M Prime, I Finnie, 'Measurement of residual stresses through the thickness of a strip using the crack compliance method'

M Gremaud, W Cheng, M Prime, I Finnie, 'Measurement of residual stresses in laser treated layers using the compliance method' presented at the 2nd Int Conf on Laser Advanced Materials Processing, Nagaoka City, Japan, 7-12 June 1992

W Cheng, I Finnie, 'A comparison of the strains due to edge cracks and cuts of finite width in a semi-infinite elastic plate'

Vidro

T A Michalske, B C Bunker, 'The fracturing of glass', Scientific American, Dec. 1987, pp.122-129

J B Ward, 'Analysis of glass fractures', Materials & Design, vol.8, (2), March/April 1987, pp.100-103

Weibull

W Weibull, 'A statistical distribution function of wide applicability', ASME Transactions, 1951, vol.73; J Applied Mechanics, vol.18, 1951, pp.293-297

C J Wang, D C Baker, 'Reliability analysis of data with no failure from fleet and proving ground endurance tests', SAE International Congress & Exposition, Detroit, Michigan, Feb.24-28, 1992; SAE Technical Paper Series 920773

S N Patankar, 'Weibull distribution as applied to ceramic fibres', J Materials Science Letters, vol.10, 1991, pp.1176-1181

A Khalili, K Kromp, 'Statistical properties of Weibull estimators', J Materials Science, vol.26, 1991, pp.6741-6752

R B Abernethy, J E Beneman, C H Medlin, G L Reinman, 'Weibull Analysis Handbook', AFWAL-TR-83-2079, Nov. 1983

P F N Andrade, 'Análise Estatística Aplicada à Fractura Frágil', Prova de Capacidade Científica, Trabalho de Síntese, Instituto Superior Técnico, Departamento de Engenharia de Materiais, Lisboa 1989

7

Livros adquiridos

Nota: esta lista inclui apenas, naturalmente, os directa ou indirectamente relacionados com os temas em estudo no período sabático. Assinalam-se com * os livros adquiridos para a Biblioteca do DEMEGI, e com ** os livros encomendados para a mesma biblioteca.

Design

National Research Council, 'Improving Engineering Design: Designing for Competitive Advantage', National Academy Press, 1991 *
(livro usado na disciplina **Design Management Seminar**, Mgt 472 da Lehigh University)

Dieter, 'Engineering Design: a Materials and Processing Approach', McGraw Hill 1988 *
(livro usado nas disciplinas **Product Design/Analysis**, MSE 423 , e **Mechanical Engineering Design**, ME101, da Lehigh University)

Juvinall, Marshek, 'Mechanical Elements', J Wiley **
(livro usado na disciplina **Mechanical Elements**, ME 151 da Lehigh University)

SAE AE-15, 'Gear Design' **

SAE AE-14, 'Multiaxial Fatigue' **

SAE AE-11, 'Spring Design' **

D A Norman, 'The Design of Everyday Things', Doubleday, 1989

H Petroski, 'To Engineer is Human: the Role of Failure in Successful Design', Vintage Books, 1992 edition

Suh, 'The Principles of Design', Oxford **

Mott, 'Machine Elements in Mechanical Design' **

Cross, 'Engineering Design Methods', Wiley **

Ensino

E L Boyer, 'Scholarship Reconsidered: Priorities for the Professoriate', The Carnegie Foundation for the Advancement of Teaching' 3rd printing, 1991

S Tobias, 'They're not Dumb, They're Different: Stalking the Second Tier', Research Corporation, 1990

C F Conrad, R F Wilson, 'Academic Program Reviews: Institutional Approaches, Expectations and Controversies', ASHE (Association for the Study of Higher Education) - ERIC (Clearing House on Higher Education) Higher Education report no. 5, 1985

S P Heyneman, I Fägerlind, eds., 'University Examinations and Standardized Testing: Principles, Experience and Policy Options', World Bank technical paper no. 78, 1988

D Albrecht, A Ziderman, 'Deferred Cost Recovery for Higher Education: Student Loan Programs in Developing Countries', World Bank discussion paper 137, 1991

Lehigh University, 'Rules and Procedures of the Faculty of Lehigh University', 1992

Alan Bloom, 'The Closing of the American Mind', Touchstone, 1987

H Rosovsky, 'The University: an Owner's Manual', W W Norton & Co, 1990

S M Cahn, ed., 'Morality, Responsability and the University: Studies in Academic Ethics', Temple University Press, 1990

G Keller, 'Academic Strategy: The Management Revolution in American Higher Education', The Johns Hopkins University Press, 1983

S Edelstein, 'The Truth about College: How to Survive and Succed as a Student in the 90's', Carol Publishing Group, 1991

US News & World Report, 'America's Best Colleges: 1992 College Guide, Exclusive Rankings' , 1992 (trata-se de uma publicação especial da revista; a propósito referem-se também os números correntes: March 23, 92, 'America's Best Graduate Schools', e April 29, 1991, 'America's Best Graduate Schools')

E T Pascarella, P T Terenzini, 'How College Affects Students', Jossey Bass, 1991 **

L V Cheney, 'National Tests: What Other Countries Expect Their Students to Know', National Endowment for the Humanities, 1991

OECD, 'Higher Education in California', OECD Reviews of National Policies for Education, Paris 1990 **

Estudos de Ciência, Tecnologia e Sociedade *(STS - Science, Technology and Society)*

T S Reynolds, ed., 'The Machine in the University: Sample Course Syllabi for the History of Technology and Technology Studies', 2nd ed., Science, Technology and Society Programs of Michigan Technological University and Lehigh University, March 1987

R Volti, 'Society and Technological Change', St. Martins Press, 1992 **

R E McGinn, 'Science Technology and Society', Prentice Hall **

A Pacey, 'The Culture of Technology', MIT Press, 1983 **

Gestão, *Manufacturing*

M L Dertouzos, R K Lester, R Solow and the MIT Commission on Industrial Productivity, 'Made in America', Harper Perennial, 1990
(livro usado na disciplina **Managerial Policy and Decision Making**, Mgt 429, Lehigh University)

J P Womack, D T Jones, D Roos, (The MIT International Motor Vehicle Program), 'The Machine that Changed the World: the Story of Lean Production', Harper Perennial, 1991
(livro usado na disciplina **Managerial Policy and Decision Making**, Mgt 429, Lehigh University)

A Morita, 'Made in Japan', Signet, 1988
(livro usado na disciplina **Managerial Policy and Decision Making**, Mgt 429, Lehigh University)

A P Sloan, 'My Years with General Motors', Doubleday, 1990 edition

D L Barlett, J B Steele, 'America: What Went Wrong?', Andrews and McMeel, 1992

D Raheja, 'Assurance Technologies', McGraw-Hill, 1991 *

Harvard Business Review, 'The New Manufacturing', Harvard Business Review Press **

S M Sze, 'VLSI Technology', McGraw Hill, 1988 *
(livro usado na disciplina **Microelectronics Manufacturing Systems & Technologies**,MSE 496 da Lehigh University)

A Armstrong Wright, 'Urban Transit Systems: Guidelines for Examining Options', World Bank technical paper no. 52, 1986

D Tannen, 'That's not What I Meant', Ballantine, 1986

A Lakein, 'How to Get Control of tour Time and your Life', Signet, 1974

E T Hall, 'The Silent Language', Doubleday, 1990 edition

Informática

P Birns, P Brown, J C C Muster, 'UNIX for People', Prentice Hall, 1985 *

K Jamsa, 'DOS: the Pocket Reference', Osborne McGraw-Hill, 1991 *

Materiais, Mecânica da Fractura

R B Abernethy, J E Beneman, C H Medlin, G L Reinman, 'Weibull Analysis Handbook', AFWAL-TR-83-2079, Nov. 1983

S P Timoshenko, 'History of Strength of Materials', Dover 1983 (republication of McGraw Hill 1953 ed.)

I Finnie, *Handouts* da disciplina **Mechanical Behavior of Materials**, ME 224, da UCBerkeley (1991)

I Finnie, *Handouts* da disciplina **Fracture of Engineering Materials**, ME 225, da UCBerkeley (Spring 1992)

RILEM Technical Committee 90 FMA, 'Fracture Mechanics of Concrete Structures: from Theory to Applications', Chapman & Hall, 1989 *

G C Sih, 'Mechanics of Fracture Initiation and Propagation', Kluwer Academic Publishers
(livro usado na disciplina **Fracture Mechanics**, Mech 413 da Lehigh University)**

E Gdoutos, 'Fracture Mechanics Criteria and Applications', Kluwer Academic Publishers1990**

T L Anderson, 'Fracture Mechanics: Fundamentals and Applications', CRC Press 1991 **

'Mechanics of Materials Exam File', Engineering Press Inc. **

Suresh, 'Fatigue of Materials', Cambridge **

ABAQUS, *Handouts* de curso sobre Mecânica da Fractura

7

Catálogos de instituições de ensino superior obtidos

Academy of Art College, Catalogue 1988-1990

Academy of Art College, Summer & Fall 92

Academy of Art College, Graduate Studies Handbook

Academy of Art College, Fine Art Department

Acedemy of Art Talk, vol.1, (2), April 10, 1992

The Academy of Art College

The Academy of Art College, Teaching Credential Program

Academy of Art College

College of Alameda, Laney College, Merrit College, Vista College, Schedule of Classes, Fall 1992

Baruch College, The City University of New York, Undergraduate Bulletin Supplement 1991/1992

Baruch College, School of Business and Public Administration, The City University of New York, Graduate Viewbook

Carnegie Mellon University, Faculty Course Evaluation, Spring 1992

Carnegie Mellon, Undergraduate Catalog 1990-1992

Carnegie Mellon University News, July 23, 1992, vol.2 (46)

Carnegie Mellon University News, July 16, 1992, vol.2 (45)

Carnegie Mellon University News, July 9, 1992, vol.2 (44)

Carnegie Mellon University Challenge - Xerox, Conference Report

Carnegie Mellon 1991-92 facts

Carnegie Mellon, About the information centers

Carnegie Mellon, Carnegie Institute of Technology, Mechanical Engineering, Research and Graduate Studies

Carnegie Mellon, Study abroad

Carnegie Mellon, Engineering

Carnegie Mellon, Industrial Management, Undergraduate Businesss

Carnegie Mellon, Design

Carnegie Mellon, Music

Carnegie Mellon, Art

Carnegie Mellon, Architecture

Carnegie Mellon, Careers in Arts Management

Carnegie Mellon, Careers in Public Policy and Management

Carnegie Mellon, Careers in Management

Carnegie Mellon, Master of Public Management

Carnegie Mellon, Doctoral Programs in Management and Public Policy

Carnegie Mellon, Academic Leadership Institute, 1992

Carnegie Mellon, Senior Executivre Seminar, 1992

Carnegie Mellon, Academic Services Newsletter, vol.9 (4), May 1992

Carnegie Mellon, College Management Program, 1992

Carnegie Mellon, Graduate Programs in Management and Public Policy

City University of New York, Graduate School and University Center, Newsreport, Jan 1992, vol.16 (3)

The City University of New York, The Graduate School, Bulletin 1991-1993

City University of New York, Graduate School and University Center, February Events

Columbia University, The Master of Arts in Liberal Studies, Programs, School of General Studies

Columbia University Bulletin, Summer Session 1992

The Curtis Institute of Music, Philadelphia, 1991-1992

Elderhostel International Catalog, Fall 1992, January 1992, (8)

Elderhostel, United States and Canada catalog, Summer 1992 Programs, March 1992, (10)

Elderhostel Catalog Supplement, International Fall 1992 Refeatured, April 1992 (11)

Elderhostel Catalog Supplement, United States/Canada Refeatured, May 1992 (12)

Elderhostel United States and Canada Catalog, Fall 1992 Programs, June 1992 (14)

Fashion Institute of Technology, a State University of New York College for Design and Business Professions, Associate and Baccalaureate Programs, Undergraduate Catalog 1991-93

Fashion Institute of Technology, State University of New York, Division of Continuing Education, Spring 1992, Schedule of Classes

Fordham University, Summer 1991, Complete Course Listings

Fordham, Fordham University, The Jesuit University of New York application folder

Fordham University, Graduate School of Education at Lincoln Center and Tarrytown, Master degree program Science K-9

Fordham: The Jesuit University of New York City, The College at Lincoln Center, Bulletin 1990-92

Fordham, The Jesuit University of New York City, (leaflet)

Fordham, Dean's Newsletter vol.4 (1) Nov 1991

Fordham, The Jesuit University of New York City, College of Business Administration, Bulletin 1990-1992

Fordham, The Jesuit University of New York City, Fordham College, Bulletin 1990-1992

The George Washington University Bulletin, Undergraduate Programs 1991-1992

The George Washington University Bulletin, Graduate Programs 1991-1992

Georgia Institute of Technology, General Catalog 1991-92

Georgia Institute opf Technology, School of Industrial and Systems Engineering Graduate Study and Research

Georgia Institute of Technology, The George W. Woodruff School of Mechanical Engineering, (9), Winter 1991

Georgia Institute of Technology, Manufacturing Research Center

Georgia Institute of Technology, The George W. Woodruff School of Mechanical Engineering, Undergraduate Handbook, Mechanical Engineering Program, 1991-1992

Georgia Institute of Technology, The George W. Woodruff School of Mechanical Engineering, Graduate Handbook, Mechanical Engineering Program, 1991-1993

Georgia Institute of Technology, The George W. Woodruff School of Mechanical Engineering, Graduate Study in Mechanical Engineering Nuclear Engineering and Health Physics

Georgia Institute of Technology, Guide to Graduate Studies

Georgia Institute of Technology, Research in the George W. Woodruff School of Mechanical Engineering: Mechanical Engineering, Nuclear Engineering, Health Physics

GMI Engineering and Management Institute 1992-93 admissions catalog

Golden Gate University Bulletin, 1991-92

A Guide to Financial Aid at Golden Gate University

California Student Aid Commission, Stafford Student Loan

Golden Gate University, Financial Aid Application Packe, 1992-93

California Student Aid, Financial Aid, Students Workbook, 1992-93 School Year

Graduate Management Admission Council, MBA Loans, 1992/1993

Golden Gate University, Application for admission to bachelor's degree programs

Golden Gate University, Application for admission to master's degree programs

Gratz College, Academic Bulletin and Course Listings, 1991-1992

Harvard University Summer School 1992, Official Register of Harvard University

Harvard Summer School, The Dance Center, 1992

Harvard University Summer School 1992, Secondary School Program

Harvard University Summer School 1992, 'English as a second language'

Hunter College North Building Bulletin, (15), Feb 3, 1992

Hunter College The City University of New York, Guide and Schedule of Classes, Undergraduate and Graduate Couerse Offerings, Spring Semester 1992

International University of America, Master of Business Administration

The Jewish Theological Seminary of America, Academic Bulletin, 1991-1992

Juilliard, 1991-1992

Juilliard, Residence Life

The Juilliard School, Application for Admission, September 1992

Juilliard, Evening Division, Spring 1992

Kirkwood Community College, Kirkwood Welcome

Lake Superior State University, Engineering Technology, Bachelor and Associate Degree Programs

Lake Superior State University, Sault Ste. Marie, Michigan, 1991-92

Lehigh University 1991-1992 Course Catalogue

Lehigh University, Director of Admissions, 'The journey of ing'

Lehigh University, Rules and Procedures of the Faculty

Lehigh Alumni Bulletin, Reunion 1991

Lehigh Alumni Bulletin, Spring 1991

Lehigh Alumni Bulletin, Reunion 1988

100 Years of Lehigh Materials Science and Engineering, 'A Look Back & a Leap Forward'

Lehigh University, Rules and Procedures of the Faculty

Lehigh University, Graduate Program in Manufacturung Systems Engineering

Lehigh University, ATLSS - Advanced technology for large structural systems: an NSF sponsored engineering research center

Lehigh University Bookstore, Winter/Spring 1992 Term Planner

Lehigh University, Campus map

Lehigh University, Bus service mountaintop, schedule of operations August 1991-August 1992, Blue Route

Lehigh University, University counseling service

Lehigh University, Student health center

Lehigh University, College of Education, Education: Sampler

Lehigh University, College of Engineering and Applied Science: Sampler

Lehigh University, College of Business ands Economics: Sampler

Lehigh University, Graduate work in History

Lehigh University, Army ROTC

Lehigh University, Art Galleries: Art and Architecture Spring 1992 lecture series

Lehigh University, Art Gelleries: Spring and Summer 1992 calendar

Lehigh University, Art Galleries: African-American Photographers Forum of Philadelphia

Lehigh University, The Lehigh University Middle Level Partnership; 'Breaking the mold: Directions for middle level education', April 3, 1992

Lehigh University, LINK The Lehigh University International Kaleidoscope, Spring 1992

Lehigh University Bus service Saucon Village, Schedule of Operations August 1991-May 1992

Lehigh University, 1991-92 Winter Sports Schedule

Lehigh University, Lehigh Wrestling 1991-1992

Lehigh University, Lehigh Basketball 1991-1992

Lehigh University, Department of Music, Music at Lehigh University, Spring semestre 1992

Lehigh University, Department of Music, Music at Lehigh University, Fall semestre 1991

Lehigh University, Office of Cultural Affairs, Event Horizon Fall 1991

Lehigh University, The international experience

Lehigh University, examination book

Lehigh University, 1992 College opf Education spring course offerings

Lehigh University, Graduate Student Council, The Observer Focus on Graduates

Lehigh University Libraries,

Lehigh University, ASA - Automated System Access to Lehigh University Libraries' Online Catalog

Lehigh University, Library Services on the Network Server

Lehigh University, Reference Services

Lehigh University, Fairchild-Martindale Library, 'Metallurgy and Materials Science - Resource Guide'

Lehigh University, Materials Science and Engineering, a Guide to Resources

Lehigh University, Industrial Engineering, a Guide to Resources

Lehigh University, Office of International Students and Scholars, Handbook for International Students and Scholars

Lehigh University, Graduate School, Application for Admission

Lehigh University Bookstore, catalog 1992

Lehigh University Bookstore, gift books

Lehigh University, Lehigh Wrestling, Lehigh vs. Wilkes, PennState, Feb.15, 1992

Maharishi International University, Inner development brings outer success

Massachusetts Institute of Technology, Technology and Policy Program, Center for Technology, Policy and Industrial Development

Mills College, International School of English

Monroe County Community College, Technology, Manufacturing Technology

Moore College of Art & Design, Moore Student Guide

National Technological University, Management of Technology, an Executive Program for Working Professionals and Managers

The New Ballet School, New York

New School of Social Resarch, The Graduate Faculty of Political & Social Science, Economics: M.A. & Ph.D. Study

New School of Social Resarch, The Graduate Faculty of Political & Social Science, Political Science: M.A. & Ph.D. Study

New School of Social Resarch, The Graduate Faculty of Political & Social Science, International Affairs: M.A. Study

New School of Social Resarch, The Graduate Faculty of Political & Social Science, Sociology: M.A. & Ph.D. Study

New School for Social Research, New School Bulletin, The Graduate Faculty, vol.48, (11), June 3, 1992

New School Bulletin, Fall 1991, Course Offerings, vol.49, (2), Sept. 3, 1991

New School Bulletin, Spring 1992, Course Offerings

New York Institute of Technology (Peterson's 1991)

New York Institute of Technology, Graduate Division, 1991-1992

New York Institute of Technology, Catalog 1991-1992

New York University Bulletin, Leonard N. Stern School of Business, Undergraduate College, 1991-1993

New York University Bulletin, Announcement for Summer 1992, vol. XCII, (2), March 9, 1992

New York University Summer 1992, Updated Course Listings

New York University Bulletin, School of Continuing Education, Announcement for Spring 1992, vol. XCII, (1), March 2, 1992

New York University Revised Spring and Summer 1992 Class Schedule, Office of the University Registrar

New York University, School of Continuing Education, Sports and Special Events Marketing, Spring 1992

New York University, School of Continuing Education, Certificate in Fitness Instruction

NYU Alumni, Midnight Sun Express and Alaska Passage

NYU Alumni, Canadian Rockies Glacier National Park

NYU Alumni, Scandinavia/Russia

NYU Alumni, Western Mediterranean

New York University School of Continuing Education, Introducing Shorter Courses that are Long on Learning

New York University, Department of Athletics, Intramurals and Recreation, Jerome S. Coles Sports and Recreation Center, Coles Program Guide 1991-1992

New York University, School of Continuing Education, Adult Degree Studies Division

Northampton Community College, Spring 1992, Non credit offerings

Parsons School of Design, Newsclips, January 21 1992

Parsons, Spring Course Offerings January 1992 vol.9 (3)

Parsons Continuing Education, August 1991, vol.8, (5)

Parsons School of Design, Winterterm, 1992 Workshops, Jan 6-17

The Pennsylvania State University, 1990-92 Graduate Degree Programs Bulletin

The Pennsylvania State University, 1990-92 Baccalaureate Degree Programs Bulletin

The Pennsylvania State University, Visitors Guide to the University
Park Campus

State College Pennsylvania, Official Visitors Guide, 1991-1992

The Pennsylvania State University, University Park Campus, Religious Affairs Directory 1991-1992

The Pennsylvania State University, The Guide to Graduate Life, 1991-92 edition

The Pennsylvania State University, Information about University Park and Community Resources, 1991-92

The Pennsylvania State University, Summer 1992, Tentative Schedule of Course Offerings

The Pennsylvania State University, Summer Sessions, Preliminary Course Schedule, 1992 University Park Campus

Pratt Institute, Pratt International Travel/Study Abroad Programs 1992

Princeton University Graduate School Announcement 1990/92-91/92

Princeton University, 1991-92 Supplement to Princeton University's Graduate School Announcement 1990-92

Princeton University, Undergraduate Announcement 1991-92

Princeton University, 'Visiting the Campus'

Princeton University, 'Straight talk about the department of public safety and crime on campus'

Princeton University, 'What you should know about sexual harassment'

1992 Princeton University Store Technical Book Catalog

Princeton University, A Guide to the Princeton University Chapel

Princeton University, Admission Office General Information 1991-1992

Princeton University, 'Most frequently asked questions about applying for admission to Princeton'

Princeton, Engineering and Applied Science

Princeton, Politics

Princeton, Admission Information 1991-92

Rensselaer Polytechnic Institute, Graduate Programs in Science and Technology Studies at Rensselaer

Rennsselaer Polytechnic Institute, Graduate Study at Rensselear

Rochester Institute of Technology, Mechanical Engineering, College of Engineering

Rochester Institute of Technology, Microelectronic Engineering

San Francisco Art Institute Summer 1992

San Francisco Art Institute, view book

San Francisco Art Institute, Summer 1992

San Francisco Art Institute, Fall 1992

San Francisco Art Institute, 1992 Peterson's

San Francisco Art Institute, 1991/1993

The San Francisco School of Art, Fine Art & Graphics Arts Programs

San Francisco State University, Extended Education, Summer 1992

San Francisco State University, Inside, vol.VIII, (3), March/April 1992

San Francisco State University, Golden Gater, vol.51, 26, May 7, 1992

San Francisco State University, The Reporter, vol.2, 2, Feb. 1992

San Francisco State University Extended Education fliers:

Film, Video, Multimedia

AUTOCAD Training Center

Tourism Institute

Tourism Program

English Fluency Program

Marketing Communications Programn

School of Science Cooperative Education Program

Get Involved at San Francisco State, Join a student orgnization

Saint Mary's College, School of Economics & Business Administration, Graduate Programs

School of Visual Arts Bulletin, Announcement for Winter/Spring 1992

School of Visual Arts, 1992-1993

School of Visual Arts, Student Housing 91/92

SUNY **State University of New York** 1992 Application Guidebook and Application

State University System of Florida Master Plan, 1988-89 - 1992-93

State University System of Florida, Annual Report 1991

State University System of Florida, Annual Report 1990

Temple University, Temple in the Evening, Undergraduate & Graduate, Spring 1992

Temple University Philadelphia, Undergraduate Bulletin 1991-92

Temple University Graduate Bulletin, 1990-1992

Temple University Music Prep, Spring 1992 Course Guide

Temple University Philadelphia Undergraduate Admissions Application 1992

Temple University Philadelphia, College of Engineering, Computer Sciences and Architecture

Temple University Philadelphia, Application for Graduate Study

Temple University Center City Spring 1992 Non-credit Course Guide

Temple University Center City Campus, The Business Agenda - Our Most Popular Seminars, Feb-Apr 1992

Temple Universiy Music Prep Division and Community Music Program, Keynotes, Fall 1991

Temple Times, vol.22 (20) March 5, 1992

The University of the Arts, Philadelphia College of Art and Design, Philadelphia College of Performing Arts

The University of the Arts, College of Art and Design, College of Performing Arts, International Student Guide

The University of the Arts, Crafts

The University of the Arts, Graduate Programs

The University of the Arts, Continuing Education, Spring and Summer 1992, Part-time Study for the Adult Learner in the Visual Arts

The University of the Arts, Philadelphia College of Art and Design, Philadelphia College of Performing Arts, Course Catalog 1991-92

University of California Press, 1992 Books in Print

University of California Press, Spring 1992

University of California Extension Media Center: Film/Video Rental Catalog 1991-1993

University of California Extension Media Center: World Cultures on Film and Video

University of California, Introducing the University 1992-1993

University of California, Introducing the University 1991-1992

California Oregon CBEST California Basic Educational Skills Test 1992 Bulletin

University of California, International Student Undergraduate Application 1992-93

University of California, Application for Undergraduate Admission and Scholarships 1992-1993

United States Department of Education, Financial Aid from the U.S. Department of Education 1992-93

UC Berkeley ASUC Professor Evaluations

UCB Distinguished Teaching Award 1991-1992, Zellerbach Playhouse May 5, 1992

UCB General Catalog 1992-1993

UCB Long Range Development Plan 1990-2005

B B Ehrich, 'Photographic Guide to the University of California, Berkeley', Pacific Books Publishers, 1969

UCB Campus telephone directory 1991-92

UCB Spring 1992 schedule of final examinations

USB Fall 1992 Schedule of classes

UCB College of Engineering 1992-93 announcement

UCB College of Letters and Science 1992-93 announcement

UCB Graduate School of Journalism 1991-92 announcement

UCB Graduate School of Education 1991-92 announcement

UCB School of Social Welfare 1991-92 announcement

UCB College of Environmental Design 1992-93 announcement

UCB Haas School of Business: The MBA Programs Fall 1992

UCB Research at Berkeley

UCB Residence Hall Living

UCB Introducing Berkeley 1991-92

UCB Cal

UCB Visitor Center, campus map

UCB Summer Session 1992

UCB Career Planning Guide 1991-1992

UCB, Financial Aid Office, Applying for undergraduate financial aid 1992-93

UCB Resource, 1991-92 edition

UCB Undergraduate admission 1992-93

UCB The optimal health center

UCB Cal Adventures, Outdoor youth program

UCB The Library Associates

UCB ASUC Cal Holiday, Cal Gift Ideas 1991-1992

UCB Cal Collection 1992-1992

UCB The Berkeley Engineering Fund, Annual Report 1990-1991

UCB, College of Engineering, Engineering News, Vol.62, 15S, May 4 1992; vol.62, 14S, April 27 1992

UCB Mechanical Engineering

UCB Berkeley Computing, April 1992, vol.2, (3)

UCB Guide to Computing Resources, June 1991

UCB The Graduate Schoool of Education, Educator, Fall/Winter 1991 vol.5 (3); Spring 1992, vol.6 (1)

UCB The Alumni Association of the School of Library and Information Studies, South Hall News, Spring 1992

UCB Public Affairs Report, Institute of Government5 Studies, vol.33, (3), May 1992

UCB Center for South Asia Studies Newsletter, Fall 1991, vol.2 (1);, vol.2(2), Spring 1992

UCB Center for Western European Studies Newsletter, April-May 1992

Berkeley Convention and Visitors Bureau, 1992 Berkeley Calendar of Events

Berkeleyan, vol.20 (20). June 17-July21 1992

UCB The Graduate, vol.VIII, (1), Spring 1992

UCB Cal 1992 Spring Sports

UCB Extension Summer 1992

UCB Extension Spring 1992

UCB Extension, High School Correspondence Courses, 1991-1992

UCB Extension, twenty third annual Oxford/Berkeley program

UCB Extension fliers:

- Object oriented programming in C++
- Working with aluminium in the submicron era
- Hands-on UNIX training in San Francisco
- CAD for competitiveness
- Design for manufacturability
- English language program in Berkeley
- Courses in library and information studies
- Training and human resource development
- Computer technologies in education

Three intensive courses on semiconductor manufacturing

High performance packaging technology

Barrier metals for microlectronics

Polycrystalline-silicon technology and applications

Chemical vapor deposition of titanium nitride for microelectronics applications

Human resource management

Computer room design

2nd national conference on classroom research and classroom assessment

Successful learning

Sports and special events: lifestyle marketing and sponsorship

Certificate in landscape architecture

Certificate in garden design

Land use and development planning

Management of water in California

Interior design and interior architecture

UCB Cal performances 1992-93

UCB Cal performances 1991-1992 season

UCB P.A. Hearst Museum of Anthropology

UCB Cal Adventures April '92 to November '92

UCB ASUC The Martin Luther King, Jr., Student Union

UCB The Berkeley Graduate, vol.6 (4), April 1992

UCB The LHS Quaterly, Summer 1992

UCB The LHS Quaterly, Spring 1992

UCB California Engineer, vol.70, (4), May 1992

UCB California Engineer, vol.70, (3), March 1992

UC Davis Summer Sessions 1992

UC Irvine, Summer Session'92

UCLA Summer Sessions 1992

UC Riverside, Summer Session 1992

UC Santa Barbara, Summer Sessions 1992

UC Santa Cruz Summer Session 1992

UC San Diego, Summer Session 1992

University of Cincinnati, College of Engineering Graduate Programs and Research, 1990-1992

University of Cincinnati College of Engineering 'UC Engineer', Spring 1991, vol.3, (1)

Cincinnati, The University, College of Engineering Bulletin 1991-92

The University of Iowa, 1991 Research in Progress

The University of Iowa, General Catalog 1990-1992

The University of Iowa, Guided Correspodence Study, Division of Continung Education, 1991-92 Catalog

The University of Iowa, General Catalog, Library and Information Science, 1990-92

Iowa'92, Iowa Football

The University of Iowa, Division of Continuing Education, 1992 Summer Session: Saturday and Evening Classes

The University of Iowa, Hancher Auditorium, Interplay: Hancher 20 years

The University of Iowa: Extending our reach

The University of Iowa: Iowa's Resource

The University of Iowa fliers:

Residence Services Conference Housing: Mayflower Hall

Cambus red route, blue route, August 1991

Division of Continuing Education

Student Health Service

College of Dentistry, Dental clinics

Services for persons with disabilities

Study abroad

Visitor's guide

Museum of Art

Welcome to the Iowa Memorial Union

Iowa House

Old Capitol

Parking and Transportation

The Alumnni Center

Alumni Association: Visions of Tradition

Gifts for What?

Residence Halls

University of Maryland at College Park, Undergraduate Catalog 1991-1992

University of Maryland at College Park, College of Engineering, Undergraduate Catalog, 1991-1992

University of Maryland at College Park, Graduate Schoool Catalog, 1991-1992

University of Pittsburgh Bulletin, School of Engineering, 1990-1992

University of Pittsburgh Bulletin, The College of Arts and Applied Sciences, 1992-94

The University of Pittsburgh, A Place to Discover

University of Pittsburgh, Naionality Classrooms

University of Pittsburgh, Stephen Foster Memorial

How to get to Pitt and Pittsburgh

University of Pittsburgh, Discover the world, discover yourself, study abroad

University of Pittsburgh, How to access on-line library catologs through PittNet

University of Pittsburgh, University Libraries, A guide for 1991/92

University of Pittsburgh, School of Engineering

University of Pittsburgh

University of Pittsburgh, Where do bright concerned students go?

The University of Pittsburgh Contact !

University of San Francisco, don 1990

University of San Francisco, College of Professional Studies, Graduate programs

University of San Francisco, At a glance

University of San Francisco, School of Education, Jesuit Education since 1855

University of San Francisco, phelan multicultural community

University of San Francisco, Foghorn, vol.88, 22, May 6, 1992

University of San Francisco Summer Session 1992

University of Washington, Libraries: a guide

The University of Washington, Campus and vicinity, 1991

University of Washington libraries: self service databases

University of Washington, Summer Qtr, 1992 Preliminary announcement for UW students

Universiy of Washington, Extension, Summer Catalog, 1992

(University of Washington), University Book Store 91/92

University of Washington, General Catalog, Undergraduate Study, Graduate Study and Research,1990-1992

Virginia Polytechnic Institute and State University, Graduate Catalog, 1992-1994

Virginia Polytechnic Institute and State University, Graduate School, Application

Virginia Polytechnic Institute and State University, Science and Technology Studies - History, Philosophy, Sociology

Vista Community College, Summer 1992: Film, drama, and literature series

Yeshiva University, Undergraduate Catalog, 1991-93

Yeshiva University, Benjamin N. Cardozo School of Law Bulletin 1991-1992

Final Report of the **West Virginia University** Planning Council 1991-92, May 1992

Materials Science & Engineering
Lehigh University, Whitaker Laboratory #5, Bethlehem, PA 18015-3195
Phone (215) 758-4220 FAX (215) 758-4244

MECHANICS/MATERIALS RESEARCH AT PORTO UNIVERSITY

SPEAKER: P. T. de Castro, Professor
Porto University, Portugal

DATE: Tuesday, February 18, 1992

TIME: 4:10 p.m. (Refreshments served at 3:45 in the Student Lounge, Room 345)

PLACE: Whitaker Lab #5, Room 207

ABSTRACT:

This seminar will describe recent work on Mechanics of Materials carried out at the Universidade of Porto, with an emphasis on fatigue and fracture problems of engineering materials. Practical use of materials data in situations such as design or fitness-for-purpose evaluations require adequate stress analysis techniques. The seminar will start with a presentation of techniques for stress intensity factor determination, for situations of increasing complexity, up to the level of real cracked components assessment. Then, specific problems of materials data generation will be described, and reference will be made to biaxial fracture of brittle resins used in GFRP and to interlaminar fracture toughness of advanced composites. Reference will be made to the needs already existing for non-fracture mechanics data, such as SN data for metallic alloys, or damage propagation curves for glass reinforced cementitous matrix composites. The seminar will end with a brief reference to the Universidade of Porto, to Porto and to the European Community.

BIOGRAPHY:

Professor de Castro was born in 1950 in Porto, Portugal. He graduated in Mechanical Engineering at the Universidade of Porto in 1973 and received an MSc in Applied Mechanics, Imperial College, London, in 1976 and PhD in Materials, Cranfield Institute of Technology, UK, in 1980. Currently, he is Associate Professor of Mechanical Engineering at the Universidade of Porto. His research interests are in fatigue and fracture of engineering materials. He is co-author of the book "Fatigue of Welded Structures" (in Portuguese) and of several papers. Professor de Castro was chairman of his department in the period 1987-1990, and is at present on sabbatical leave in the United States (at Lehigh University until March, and at U.C. Berkeley until August).

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Paulo DeCastro

attended all of the sessions and completed the work and study requirements for

Course Number 16. Science, Technology and Society

which was offered during the academic year 1991-92 *at the Field Center located at*

Temple University

this 7th *day of* March 1992.,

Course Director

Field Center Coordinator

Carnegie Mellon

This certifies that

Paulo Tavares de Castro

has completed the

College Management Program

an intensive course of study in the
management of higher education

Robert Mehrabian
President, Carnegie Mellon University

Dean, H. John Heinz III School of
Public Policy and Management

July 24, 1992

THE HIDDEN GENOCIDE OF
EAST TIMOR

EYEWITNESS ACCOUNTS OF THE NOVEMBER 12, 1991 MASSACRE

Tuesday, March 3, 1992 • 7:30 PM

Rauch Business Center ,Room # 91 (corner of E. Packer Ave. and Taylor St.)
Lehigh University

Speakers : **Amy Goodman** and **Allan Nairn** - reporters who witnessed the massacre by Indonesian soldiers.

The **Right Reverend Paul Moore**, Bishop of New York (Ret.,Protestant Episcopal Church) .

Sponsored by: - Progressive Students Alliance , LU
- Graduate Students Council, LU
- Portuguese American Club , Bethlehem, PA
- LEPOCO - Lehigh Pocono Commitee of Concern

Further Contact: José Basto; (215) 758-1846;
InterNet : **jb00@lehigh.edu**

Exames das Universidades e dos seus Programas

Paulo Tavares de Castro

Registados nas páginas anteriores os depoimentos de três especialistas estrangeiros na problemática da avaliação de universidades, e porque a possível implementação de um tal procedimento entre nós não se deve limitar à escolha de um modelo como no *prêt-a-porter*, pareceu oportuno incluir mais uma reflexão, agora por um docente desta universidade. Serão assim feitas considerações sobre a experiência estrangeira e o conceito de qualidade, e em seguida serão analisados os diversos aspectos de qualquer exame de instituição de ensino superior ou de seus programas.

Introdução

A avaliação de universidades e dos seus programas é um procedimento com tradição no meio anglo-saxónico, embora também aí seja possível identificar uma grande variedade de situações. Assim, as universidades do Reino Unido são dotadas pelo *charter* respectivo de grande autonomia, e, ainda que objecto de financiamento pelo Estado (com excepção da única universidade privada, a de Buckingham), a avaliação da sua acção era tradicionalmente conduzida através de mecanismos internos ao meio universitário, como o sistema de examinador externo para o ensino e *peer reviews* para a investigação (1). No Canadá, o ensino superior tem sido encarado — tal como os cuidados de saúde — como um bem público social (2), pelo que não só as universidades são estatais, mas também o sector público detém o monopólio desta actividade, no sentido de assegurar *standards* equivalentes para todos os participantes; ainda assim, a avaliação dos programas é tipicamente entregue a associações de universidades, como por exemplo o Council of Ontario Universities (3). Nos EUA há, naturalmente, maior variedade. Coexistem sectores público e privado, o primeiro dependente dos estados (o governo federal tem muita pouca intervenção) e o segundo originado por igrejas e outros interesses. Aqui, é interessante registar o papel regulador dos *higher education state boards* ou *agencies,* que levam a cabo exames periódicos dos programas do sector público, e em alguns casos também do sector privado, tendo em vista designadamente o evitar da oferta de programas repetidos numa mesma área geográfica (4). É parte desta realidade, também, a acreditação de cursos por associações especializadas, de que são exemplos, nos casos dos EUA, a ABET (Accreditation Board for Engineering and Technology) ou a AACSB (American Association of Collegiate Schools of Business), para citar apenas dois.

Na Europa (continental), não obstante as grandes diferenças entre, por exemplo, a tradição Humboldtiana na Alemanha, ou Napoleónica em França, um traço comum existe, que é o da grande intervenção do Estado: tradicionalmente o principal (frequentemente único) financiador do sistema, prescrevia *ex ante* que cursos se poderiam realizar, os seus conteúdos, etc. O aumento do número de alunos, que transformou o ensino superior de sistema destinado a uma élite académica, num sistema de massas (a FEUP tem tantos docentes, em 1992, como alunos em 1963), a diversificação do sistema (incluindo, em Portugal, um crescente sector privado, cujas peculiaridades já foram objecto da intrigada atenção da imprensa internacional (5)), alguma orientação no sentido da autonomia institucional diminuindo os controlos *ex ante* e, *last but not least,* o estímulo da integração da comunidade europeia acarretando a mobilidade de profissionais — que supõe o reconhecimento de habilitações — e crescentes trocas de estudantes (ERASMUS, ECTS, etc.) — o que supõe alguma confiança mútua das instituições envolvidas —, tudo isto leva a crescentes pressões no sentido do desenvolvimento de mecanismos de avaliação das universidades e seus programas. Em particular, a Comissão das Comunidades Europeias, em recente *memorandum* relativo à educação superior, refere explicitamente: '*...the widening perspectives of higher education institutions in Europe would add a European dimension to the entire question of quality. Quality judgements would tend to influence choices in the establishment of partnerships and participation in networks within European structures and would also be a factor in the granting of academic recognition and hence in facilitating mobility...*'(6).

A qualidade

Uma questão central de qualquer exame é a da qualidade, embora não seja questão única — muitos dos exames a instituições de ensino superior têm em vista conduzir a melhorias da qualidade, mas outros visam melhorar o rendimento dos recursos investidos, ou simplesmente a racionalização de sistemas de ensino superior por eliminação de programas duplicados, etc. Mas o que é então a qualidade? qual é a sua essência? São perguntas de difícil resposta, e, face à esterilidade da sua procura, sugere-se em alternativa (7) que não haverá uma definição de qualidade mas sim tantas quantos os actores interessados no ensino superior (alunos, docentes, governo, empregadores, etc.) vezes os objectivos ou dimensões que estes actores distinguem. A conclusão necessária é então a de que a diversidade

de um sistema de ensino superior é uma dimensão essencial da sua qualidade.

O interesse que a indústria dedica à questão da qualidade leva a que se multipliquem tentativas de transpor para o ensino superior critérios e procedimentos do meio industrial, ainda que a especificidade dos dois meios levante dificuldades — por exemplo, o meio universitário tem tradicionalmente o *ethos* da excelência (estudar 'para o dez' é considerado lastimável...), enquanto que no meio industrial o problema se coloca de maneira diferente. Duas atitudes podem ser identificadas: a que se inspira na normalização ISO9000 (8), incluindo a elaboração de um manual de garantia da qualidade (9), via criticada pela persistência da referência à distinção entre executantes e controladores (10), e a que se baseia na filosofia da qualidade total (TQM - Total Quality Management), que privilegia uma cultura organizacional visando a satisfação das necessidades do 'cliente'. Já foi nesta revista referido que o sucesso da aplicação desta filosofia a alguns sectores de serviços sugere a sua adequação ao meio do ensino superior (11). De facto, universidades como a Carnegie Mellon investem considerável esforço na implementação de tal filosofia, realizando seminários para o pessoal docente e administrativo em que se discute como promover e medir a satisfação do(s) 'cliente(s)' interno(s) ou externo(s) da universidade, como os caracterizar, e como promover a auto-avaliação dentro da instituição (12). A identificação dos 'clientes' depende do aspecto sujeito a exame: se o ensino, são os alunos, seus pais, empregadores, etc.; se a investigação, serão o governo e a indústria, outras entidades financiadoras, mas também os pares. A consideração dos alunos como clientes é, naturalmente, polémica: eles são um 'produto' do processo educativo, mas são 'clientes' do serviço (9, 10).

Os exames em exame

Exames e avaliações das universidades e dos seus programas estão assim na ordem do dia, embora sejam com frequência criticados pelo tempo que consomem. Tais procedimentos devem ser de efeito benéfico, justos, completos, válidos, abertos e bem publicitados, eficazes na produção de resultados, e finalmente práticos e sem originar perdas de tempo (13). O último ponto é particularmente relevante quando se principia a aplicar ao tempo dos professores a ideia de custo de oportunidade, associada ao valor do que poderia ter sucedido, acaso aquele tempo não fosse desperdiçado com tarefas que lhes não dizem respeito, ou mesmo seja subtraído à universidade...

Modelos de exame possíveis (4) são: (i), os baseados nos objectivos declarados: qual foi o desempenho do programa em relação aos objectivos?, (ii), os baseados nas actividades e resultados: a atenção é focada nas actividades e seus efeitos, sem referência aos objectivos, (iii), os orientados para a tomada de decisões, numa tentativa explícita de associar a avaliação e a tomada de decisões, e finalmente, (iv), os do tipo *connoisseurship:* exame por especialistas, valorizado dada a sua reputação e um sistema de valores compartilhado.

Como poderá a qualidade ser definida ou medida? Através (i), da reputação: avaliação inferida através do julgamento dos *peers,* (ii), dos recursos humanos e materiais: alunos, docentes, equipamento, instalações, eficácia dos sistemas de gestão, etc., (iii), dos resultados: publicações dos docentes, sucessos dos ex-alunos, satisfação dos empregadores, etc., ou (iv), do 'valor acrescentado', isto é, aquilo que a instituição contribuiu para a educação dos alunos, estimado 'medindo' a qualidade dos alunos à saída, e subtraindo a 'medida da sua qualidade' à entrada (14) (medida de qualidade na qual as Harvard deste mundo — com a máxima selectividade à entrada — ficam a perder relativamente a instituições eficientes mas de acesso menos elitista...). A maioria das instituições adopta uma avaliação da qualidade integrando aspectos das quatro perspectivas acima.

Neste contexto é usual a referência aos *peer reviews:* o exame por pares, exteriores à instituição, contribui para a garantia da qualidade através de calibração face a referências exteriores, e propicia uma prestação pública de contas; por outro lado, dado que funciona na base de sistemas de valores compartilhados, ultrapassa a necessidade de especificar *standards*. Ainda que por vezes criticado, o sistema de *peer review* (definido com alguma ironia, a propósito do financiamento da investigação, como *'a group of committees whose members hand out grants to each other and to their friends'* (15)) poderá ser uma resposta aos problemas da definição de qualidade no ensino superior, da diferenciação competitiva de instituições e programas, e do significado do processo educativo.

Com que objectivos é que exames e avaliações são levados a cabo? Diversos, alguns dos quais conflituosos entre si: melhoria da instituição, prestação pública de contas, como base para a distribuição ou alocação de recursos, racionalização de um sistema ou mesmo para decidir o encerramento de algum programa; não é, naturalmente, possível um mesmo exame promover simultaneamente a melhoria da qualidade de um programa, e propor o seu encerramento... Kells (16) refere a necessidade de atenção a possíveis incongruências entre os objectivos e os procedimentos do exame ou da avaliação: por exemplo, exames que se destinam a dar garantias ao público mas não empregam validação externa à instituição, ou avaliações que se destinam a promover a melhoria da instituição mas não empregam alguma forma de auto-avaliação.

Nos EUA, os exames às universidades podem ter origem designadamente em organismos estaduais, associações de universi-

dades, instituições encarregadas da acreditação de cursos, as administrações das próprias universidades, ou mesmo alunos; as motivações serão, naturalmente, diversas: enquanto os financiadores da universidade e sua administração estarão preocupados com a rentabilidade, as agências de acreditação cuidam de garantir que programas idênticos em diferentes instituições atingem *standards* mínimos de qualidade.

Seja qual for o contexto em que a avaliação tem lugar, aspectos que, em geral, têm de ser tratados incluem: definição de objectivos do exame ou da avaliação, selecção do(s) programa(s) a avaliar, escolha de examinadores ou avaliadores (internos ou externos à instituição), modelo para a avaliação, critério da avaliação (qualidade, necessidade do programa, procura, custo) e metodologia (qualitativa ou quantitativa).

As questões ou problemas maiores em exames e avaliações, identificados na ref. 4, são: (i), acomodar num mesmo exame objectivos múltiplos, (ii), seleccionar o modelo de exame, (iii), avaliar a qualidade, (iv), escolher os avaliadores internos e/ou externos à instituição, (v), fomentar as consequências práticas dos exames e, finalmente, (vi), avaliar os resultados dos exames.

Uma tipologia das práticas de gestão da qualidade no ensino superior, não inteiramente coincidente, aliás, com a análise anteriormente apresentada, é dada por Westerheijden na ref. 7 e transcrita no quadro seguinte:

Tipologia de práticas de gestão da qualidade

objectivo:	melhoria	prestar contas		
alcance:	ensino	investigação	serv. à socied.	gestão
enfoque:	*input*	processo	*output*	
método:	objectivo	subjectivo		
persp. temporal:	*ex ante*	*ex post*		
origem:	governo	ass. de inst. de ESup.	inst indiv.	actores externos
agente:	governo, ou agência	ass. de inst. de ESup.	inst indiv.	actores externos

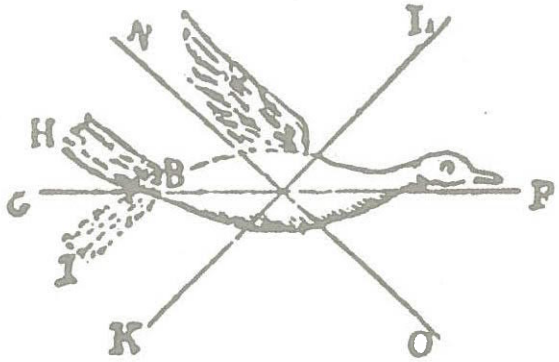
Notas finais

O discurso dos políticos está agora recheado de referências a indicadores de *performance*, critérios de eficiência, geração de recursos, auto-financiamento e outros conceitos do mundo dos negócios, correndo-se o risco de, com tanta metáfora, distorcer a própria ideia de Universidade. Para variar, é útil recordar verdades antigas: Lord Beloff, por exemplo, lembrava recentemente, a propósito da ideia de universidade, que *'the great heresy is to believe that its contribution to society should be the subject of direct measurement in terms other than the qualities of knowledge and understanding displayed by those who as students have passed through its doors'* (17), e um quadro da National Science Foundation dizia que *'the university is not supposed to be in the 'knowledge business', it is supposed to be in the business of producing knowledgeable people'* (18).

O que fica dito sugere que a concepção do sistema de exame às universidades e seus programas, entre nós, deve ter em consideração uma grande diversidade de factores, além, naturalmente, da especificidade nacional. Seja qual for a solução adoptada, haverá que ter em consideração a existência de um vasto sector privado, que, tal como o público, deve ser avaliado e examinado. É também necessário que os processos de avaliação tenham consequências práticas, sob pena de se virem a desacreditar.

A experiência nos EUA (4) sugere que recomendações virão certamente a ser feitas acarretando um aumento de despesa, particularmente no caso das avaliações por *peers* (segundo a referência citada, os *peers* usualmente preconizam a resolução de problemas propondo maiores financiamentos...), embora Kells (16) sugira que do processo de avaliação poderão resultar economias. A ligação do financiamento às avaliações é um ponto polémico: Kells (16) sugere que a ligação da avaliação ao financiamento é um processo de promoção da qualidade, enquanto a ref. 4 sugere que a avaliação deve ser consultada por quem decide os financiamentos, mas não os define automaticamente.

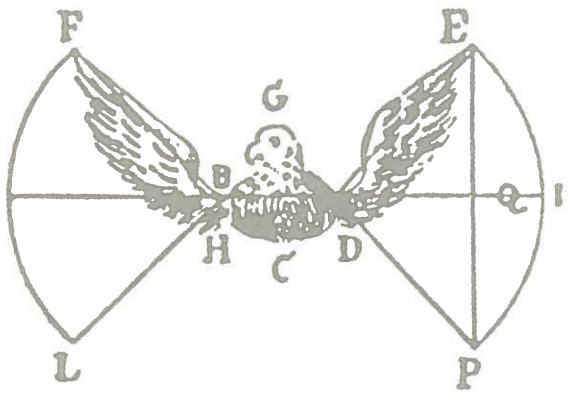
A propósito, refere-se que no Reino Unido, onde recentemente se verificaram transformações vultuosas no sistema de ensino superior — transformação dos politécnicos em universidades acabando com a dependência dos primeiros face ao CNAA, designadamente no tocante à capacidade de atribuir graus académicos —, prevalece agora a filosofia de que ao Estado cabe não o financiar as universidades através de financiamentos globais, mas sim adquirir serviços (19); daí decorre a ideia da licitação entre instituições, na qual o Estado faz a alocação de recursos privilegiando



aquelas que, *ceteris paribus*, fazem o serviço do modo mais económico. Vigora uma curiosa fixação na ideia de mercado (20, 21), como se os 'mercados' do ensino superior não fossem metáforas, que o próprio Adam Smith teria dificuldade em reconhecer... (por exemplo as propinas, um possível elemento 'de mercado', são no Reino Unido pagas às universidades pelas autoridades locais dos estudantes, não tendo — pelo menos até 1991 — nenhum governo arriscado tentar alterar tal situação... (14)). Em qualquer caso, esta moda tem pelo menos a virtude de chamar a atenção para a necessidade de avaliações periódicas das instituições e seus programas: o *ceteris paribus* constitui, naturalmente, o busílis da questão...

Para concluir, refere-se o cuidado com que devem ser manuseados índices quantitativos. Só dois exemplos. Primeiro, na investigação: qualidade é frequentemente associada a abundância de citações — um artigo com cem citações favoráveis é infinitamente mais valioso que cem artigos com uma citação cada (21); mas atenção, como já referido nestas páginas (22) há *nuances* que devem ser tomadas em consideração por quem sabe destas coisas... Segundo, no ensino: é usual referir a relação número de discentes por docente. Só que os números nem sempre são comparáveis, e certamente que nos EUA ou no Reino Unido seria julgado com severidade quem incluisse os candidatos a MSc e PhD, que colaboram no ensino, entre o corpo docente para efeito da definição da relação acima. E, numa fracção, o estatuto de numerador ou de denominador não é indiferente...

O inventário de problemas e dimensões do processo de avaliação apresentado sugere a complexidade do problema; espera-se ter ilustrado que o uso de indicadores de desempenho, se isolado e sem mais, não passa de uma ferramenta para os que desejam referir-se ao — ou interferir no — sistema do ensino superior sem ter a maçada de o tentar compreender.



Referências

(1) R W Harris, 'The CNAA, accreditation and quality assurance', *Higher Education Review*, vol.22, (3), 1990, pp.34-54
(2) M L Skolnik, G A Jones, 'A comparative analysis of arrangements for state coordination of higher education in Canada and the United States', *Journal of Higher Education*, vol. 63, (2), 1992, pp.121-142
(3) D R F Taylor (Carleton University, Ottawa), correspondência de Nov 1992 relativa a 'Province of Ontario: Funding and Appraisal Structure'
(4) C F Conrad, R F Wilson, 'Academic program reviews: institutional approaches, expectations, and controversies', *ASHE (Association for the Study of Higher Education) - ERIC Higher Education Report,* no. 5, 1985
(5) *Times Higher Education Supplement*, 'Private colleges could go way of kiwi farms', 25 Sept.1992
(6) Commission of the European Communities, Task Force Human Resources, Education, Training and Youth, *Memorandum on higher education in the European Community*, p.17, 1991
(7) D F Westerheijden, 'Systems of quality assessment in european higher education', *4th conference of the EAIE - European Association for International Education*, Berlin, 5-7 Nov. 1992
(8) W A Taylor, 'Assuring quality of engineering education: issues of effectiveness and the ethos of excellence', *European Journal of Engineering Education*, vol.15, (1), 1990, pp.5-11
(9) B J Brinkworth, 'The quality assurance manual for an engineering course - a UK example', *European Journal of Engineering Education*, vol.16, (4), 1991, pp.361-370
(10) J D T Tannock, 'Industrial quality standards and total quality management in higher education', *European Journal of Engineering Education*, vol.16, (4), 1991, pp.353-360
(11) A A Fernandes, 'Gestão das universidades e qualidade do ensino', *Boletim da Universidade do Porto*, nº16 (5 / Ano II), 1992, pp.17-18
(12) Xerox - Carnegie Mellon University Challenge, *Conference report*, conf. on Total Quality Management, Rochester, NY, June 7-12, 1992
(13) K J Gregory, 'Assessing departmental academic performance: a model for a UK university', *Higher Education Review*, vol.23 (2), 1991, pp.48-60
(14) P Swinnerton-Dyer, 'Policy on higher education and research: The Rede lecture 1991', *Higher Education Quarterly*, vol.45, (3), 1991, pp.204-218
(15) G D L Travis, H M Collins, 'New light on old boys: cognitive and institutional particularism in the peer review system', *Science, Technology and Human Values*, vol. 16, (3), 1991, pp.322-341
(16) H R Kells, 'Purposes and means in higher education evaluations', *Higher Education Management*, vol.4, (1), 1992, pp.91-102
(17) Lord Beloff, 'Reviews: Beginnings', *Higher Education Quarterly*, vol.45, (3), 1991, pp.267-270
(18) B H Sheahan, J A White, '*Quo vadis,* undergraduate engineering education?', *Engineering Education*, Dec. 1990, pp.1017-1022
(19) G Johnes, 'Bidding for students in Britain - why the UFC auction 'failed' ', *Higher Education*, vol. 23, 1992, pp. 173-182
(20) A Howarth, 'Market forces in higher education', *Higher Education Quarterly*, vol.45, (1), pp.5-13, 1991
(21) J Ziman, 'Academic science as a system of markets', *Higher Education Quarterly*, vol. 45, (1), 1991, pp.41-61
(22) J M Araújo, 'A difícil arte de avaliar: uma opinião', *Boletim da Universidade do Porto*, nº11, Nov./Dez. 1991, pp.18-19

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