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SUMÁRIO

APRESENTAÇÃO

Concluída mais uma avaliação dos programas de pós-graduação, em 2001, é tempo de refletir, como é de costume, sobre procedimentos e resultados para não deixar o exercício de avaliação virar simples rotina. Não há dúvida de que há aspectos que podem ser melhorados, e os questionamentos e as sugestões vindos dos docentes e pesquisadores que se envolveram no processo – enquanto avaliadores ou enquanto avaliados – é contribuição preciosa para a CAPES pensar sobre quais seriam os ajustes necessários, quais os desejáveis e quais os possíveis. Na seção Estudos e Dados, Júlio Sérgio Marchini, Irineu Tadeu Velasco (que integraram a Comissão de Avaliação da Medicina I) e João Pereira Leite levantam a questão da "homogenia" e "heterogenia" entre grandes áreas do conhecimento e mesmo no âmbito de uma mesma área. Analisando uma amostra de programas pertencentes ao que denominam de "áreas biológicas", observam que há discrepância entre o fator de impacto das publicações de programas avaliados por diferentes comissões e as notas a eles atribuídas. Sugerem os autores que o CTC da CAPES estabeleça parâmetros para avaliação da produção científica, sobretudo para a atribuição de notas 6 e 7, para que as diferentes comissões adotem os mesmos padrões ao julgarem a qualidade internacional dos cursos.

O fenômeno dos cursos "fora de sede" foi, pela primeira vez, objeto de atenção específica na avaliação deste ano. As medidas emergenciais adotadas pela CAPES revelam que a problemática é complexa e que deve ser enfrentada com políticas coerentes por parte da agência. Jaime Fensterseifer, membro do CTC e coordenador da Comissão de Administração e Turismo no triênio 1998-2001, mostra, em "O imbróglio dos Fora de Sede", na seção OPINIÃO, que apesar das suspeitas levantadas, os resultados da avaliação em separado da CAPES foram, em geral, animadores. O autor alerta, entretanto, que, se é sério o problema para os cursos fora de sede oferecidos em modo presencial, o imbróglio pode tornar-se muito maior na avaliação de 2004 se outras modalidades – como o ensino a distância e os mestrados profissionais – não forem discutidas a contento, e orientações claras e critérios específicos de avaliação não forem elaborados.

Na seção DOCUMENTOS, é apresentado o último grupo de relatórios das Avaliações Internacionais, resultado das visitas realizadas por consultores estrangeiros, em março e setembro de 2000, a programas com notas 6 e 7 das áreas de Engenharia, Física, Química e Ciências Agrárias. São reproduzidos na integra os relatórios originais, com um resumo em português, relativos aos vinte programas visitados da Engenharia, oito da Física, nove da Química e seis das Ciências Agrárias (só da Universidade Federal de Viçosa). No total, foram 43 os programas visitados por 29 especialistas estrangeiros.

Ainda com referência à avaliação da pós-graduação, a seção CAPES INFORMA traz um resumo das características e dos resultados da Avaliação de 2001. É apresentada a lista dos novos representantes de área e dos membros que compõem o Conselho Técnico Científico – CTC, para o triênio 2001/2004, que serão responsáveis, portanto, pela próxima avaliação da CAPES.

ESTUDOS & DADOS

Avaliação da Pós-Graduação da CAPES: homogenia ou heterogenia?*

Resumo

No Brasil, nos últimos 50 anos, o papel desempenhado pela CAPES no gerenciamento da pós-graduação *stricto sensu* pode ser avaliado com sucesso. Com a regulamentação da pós-graduação, na segunda metade da década de 1960, várias instituições de nível superior, no Brasil, criaram seus cursos de pós-graduação. Após a implantação do sistema de avaliação, em 1976, e o aperfeiçoamento gradativo desse sistema, o denominador comum que permeou a análise de desempenho dos cursos foi a valorização da produção científica, definida para cada área do conhecimento. Idealmente, o conhecimento produzido no Brasil, tem de ser comparado com à produção científica das melhores escolas, reconhecidas internacionalmente como de excelência. Desta maneira, uma das características da avaliação da pós-graduação *stricto sensu* é a possibilidade de sua universalização. O presente estudo compara a produção científica, no ano de 2000, de diferentes programas de pós-graduação avaliados com a mesma nota pela CAPES. A hipótese de trabalho é que a nota final deve refletir uma avaliação homogênea e, conseqüentemente, os programas com notas iguais devem apresentar uma produção científica similar. Este trabalho foi realizado a partir de informações disponíveis no portal da Capes (www.capes.gov.br). Em um primeiro momento, foram agrupados todos os programas (cerca de 1.550) de acordo com a nota da avaliação de 2000. Em um segundo momento, foram escolhidos ao acaso 12 programas, metade com nota seis e metade com nota cinco, entre as diferentes comissões de áreas das ciências biológicas. Nestes, foram avaliados: as publicações do ano 2000, o total de pesquisadores dos respectivos cursos, o número de trabalhos apresentados em congresso e o número de pesquisadores orientadores em relação ao número de alunos. Para se classificar as publicações utilizou-se o fator de impacto de cada publicação (Journal of Citation Report de 1998). Todos os programas foram reunidos em apenas três grandes grupos: grupo das áreas biológicas, das exatas e das humanas – divisão essa que difere da adotada pela CAPES. Verificou-se que, comparativamente, há o predomínio de notas 1 e 2 (as mais baixas da escala) na áreas biológicas, enquanto nas humanas e exatas predominam as notas 6 e 7. Observou-se que dentro das biológicas a análise de publicações revela uma grande heterogeneidade. Cursos cujas publicações apresentam um alto fator de impacto foram avaliados com a mesma nota atribuída à cursos com publicações de baixo impacto. Há também nítida diferença quanto ao total de trabalhos completos publicados e a nota da CAPES. Em geral, cursos que têm um elevado número de resumos apresentam uma relação publicações/orientadores muito baixa, além de baixo fator de impacto nas respectivas publicações. Conclui-se que há uma distribuição desigual das notas quando se considera as diferentes comissões de áreas dos 3 grupos estudados, com nítido predomínio de notas 6 e 7 nos programas de exatas e humanas. Nas áreas biológicas, a atribuição de notas não é homogênea quando se consideram as publicações e o seu respectivo fator de impacto. Também não pode ser considerado uniforme o número de publicações quando se considera trabalhos completos e resumos, relacionados com o número de docentes orientadores.

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Introdução

No Brasil o papel desempenhado pela CAPES no gerenciamento da pós-graduação *stricto sensu* pode ser avaliado em várias áreas do conhecimento, tanto nas humanas, como nas biológicas, como nas exatas. Após a fundação da CAPES, nos anos 1950, houve um lapso de aproximadamente 20 anos para que a pós-graduação fosse devidamente formalizada e regulamentada. Até então, o processo de doutoramento não tinha uma regra fixa, variando de instituição para instituição, e pouquíssimas pessoas tinham acesso à titulação. Na grande maioria das vezes, os titulados eram professores universitários de sólida carreira que, sem uma orientação definida, desenvolviam projeto de pesquisa e solicitavam à respectiva congregação a possibilidade de defender sua tese. Era um processo lento e extremamente elitista.

Com a regulamentação da pós-graduação *stricto sensu*, no início dos anos 1970, várias instituições de nível superior no Brasil, nas mais diferentes áreas do conhecimento, criaram seus cursos de pós-graduação. Na Universidade de São Paulo, em particular, foram criados vários programas de mestrado e doutorado. Desde então, estes cursos se expandiram para todo o Brasil sendo que, atualmente, cerca de 1.550 programas de pós-graduação são credenciados e avaliados periodicamente pela CAPES.

Nestes últimos 30 anos, o sistema de avaliação da pós-graduação *stricto sensu* sofreu várias modificações: comissões foram criadas, processos foram reavaliados, discussões de grupos de pesquisadores foram estabelecidas, enfim, a comunidade científica participou ativamente em todo este processo. Não se pode negar que durante este processo houve a participação intensa de importantes expoentes da comunidade acadêmica em diferentes momentos, buscando sempre o aprimoramento do sistema como um todo.

Preocupações constantes nessa busca foram de manter o sistema de avaliação como um processo homogêneo e de valorizar a produção científica brasileira. Um dos grandes problemas enfrentados, para o qual ainda não se encontrou consenso no âmbito da comunidade acadêmica, é a identificação de um denominador comum, entre as áreas, que permita um único entendimento sobre como definir produção de conhecimento.

Diferentes áreas do conhecimento entendem como produção bibliográfica trabalhos científicos de natureza díspare, o que definitivamente não permite que as diversas comissões de avaliação tenham uma concepção uniforme e coerente do que seria produção de conhecimento inovador. Assim, nas áreas humanas, sem citar subáreas específicas, a produção intelectual é diferente da das áreas exatas e também da das biológicas. O meio de divulgação e o reconhecimento intelectual do produto final, em cada uma delas, pressupõem particularidades que, definitivamente, não podem ser agrupadas como um evento único.

No entanto, não pode haver dúvidas de que a produção intelectual de um determinado grupo de pesquisa, ligado ou não a uma instituição formal de ensino superior, pública ou privada, obrigatoriamente tem de se enquadrar em um número comum de itens. Somente assim o sistema pode ser avaliado como um todo, comparado, premiado, melhorado e, por fim, valorizado.

Particularmente quando se procura avaliar a pós-graduação *stricto sensu*, a busca de fatores comuns de avaliação, independentemente da área de conhecimento, passa basicamente por 2 aspectos: características didático-pedagógicas da formação e divulgação do conhecimento produzido no sistema. Nesse ponto é importante ressaltar que somente é possível divulgar conhecimento quando há produção científica.

Desta forma, um ponto comum, que parece ser o mais importante no processo geral de avaliação, diz respeito à divulgação do conhecimento produzido. E qual seria o melhor meio de divulgação? Novamente aparece o problema das diferenças entre as diversas áreas do conhecimento. No entanto, qualquer que seja a origem do conhecimento, qualquer que seja o tipo ou o veículo de divulgação, este processo tem de ser avaliado pelos pares, em nível internacional.

Não faz sentido contentar-se com uma avaliação local, sem a devida comparação com os demais pares, estejam eles no Brasil ou no exterior (comparação internacional).

Para que seja atribuído grau de excelência ao conhecimento produzido, este deve ser comparado com a produção de escolas, institutos de pesquisa ou universidades de excelência, estejam elas onde estiverem. Não há razões para limitar-se a comparar os trabalhos produzidos somente no âmbito local, evitando comparações aos de outras regiões ou países. Justificar comparações apenas regionais alegando diferenças no grau de desenvolvimento científico ou econômico de determinada região ou nação é insustentável. O conhecimento divulgado deve almejar a excelência em qualquer que seja a área, em qualquer que seja o local onde é produzido. Só quando a excelência é aferida com padrões globais, e não locais, tem-se um parâmetro de medida eficaz e apropriado da produção científica de um grupo.

Não se pode correr o risco de evitar a comparação escudando-se no argumento de que um determinado tipo de conhecimento adquirido tem relevância tipicamente local (podem ser citados vários exemplos, como os peculiares da África ou da Ásia). Este é um argumento que acaba por justificar a incompetência. O emprego do método científico apropriado, a justificativa, o objetivo, a hipótese, a coleta de dados, a apresentação dos resultados, são processos sempre comparáveis e de importância ímpar. Sem procurar grandes exemplos, ou sem correr o risco de imperfeições, cite-se as medidas de saúde pública que foram tomadas na Inglaterra na primeira metade do século XX e que tinham por objetivo resolver um problema local e que foram, e ainda são, relevantes para o mundo interno.

Uma das características da avaliação da pós-graduação *stricto sensu* é a possibilidade de sua universalização. Também os aspectos relativos ao processo didático-pedagógico e ao tempo de formação da pós-graduação devem ser comparáveis entre diferentes instituições, sempre que se busque formação similar. Assim, não se justificam práticas didáticas totalmente diferentes dentro de instituições similares, com objetivos finais semelhantes. O mesmo pode ser dito a respeito do tempo de titulação. A pós-graduação, nesse sentido, deve ser entendida como um processo intermediário na formação do jovem pesquisador, e nunca como ponto final. Esse é o primeiro passo da carreira universitária do pesquisador, e como tal deve ser bem definido e mensurável. São muitos os aspectos a serem considerados. Assim, não só é importante o tempo de formação, como também a idade final do formando. A eficiência do sistema que titula mestres e doutores com idade superior a 50-55 anos deve ser questionada, pois não se justifica capacitar pessoas que vão deixar o sistema logo a seguir.

Os aspectos didáticos e o tempo de formação, no entanto, não fazem parte da presente discussão. O objetivo deste estudo é fazer uma comparação crítica da produção científica entre os programas das áreas biológicas. Não é muito difícil defender o ponto de vista de que a produção científica nas áreas biológicas deve ser medida, principalmente, pela divulgação em revistas científicas de qualidade. Também parece não haver questionamentos sobre o fato de que essa produção deva aparecer em meios que são acessíveis não só localmente, mas em qualquer parte onde ocorra produção científica similar. Desta maneira, não se justifica ter uma idéia brilhante, conseguir um auxílio significativo, defender uma tese e, por fim, armazenar os resultados obtidos nas “prateleiras de teses” das bibliotecas das universidades. O material produzido deve ser divulgado. A revolução da informática dos últimos anos favorece essa divulgação do conhecimento de maneira ampla e irrestrita. Trabalhos produzidos em diferentes partes do mundo, e adequadamente publicados, são facilmente acessíveis a partir de buscas em bancos de dados internacionais. O gráfico1 é um exemplo de programa de pós-graduação no qual se observa a produção científica publicada antes e após a implantação do programa. Nota-se um claro aumento no ritmo de publicações após a implantação da pós-graduação.

No presente trabalho, é comparada a produção científica do ano 2000 de diferentes programas de pós-graduação que obtiveram a mesma nota na avaliação da CAPES. A hipótese de trabalho é de que notas iguais devem resultar – numa avaliação homogênea – de produções científicas similares.

Material e métodos

O estudo foi realizado a partir de informações públicas obtidas de publicações oficiais da CAPES. Todos os dados estão disponíveis no portal da Capes (www.capes.gov.br), sem qualquer restrição para consulta.

Em um primeiro momento foram catalogados todos os programas avaliados, cerca de 1.550, considerando o triênio 1998-2000. Estes programas foram divididos como pertencentes a áreas biológicas, humanas e exatas. A seguir, construi-se um histograma, tendo como ponto de corte as notas de 1 a 7. O sistema CAPES classifica os cursos com notas 1 e 2 de insuficientes, e aqueles com notas 6 e 7 como de padrão internacional.

Em um segundo momento, foram escolhidos ao acaso 12 cursos, sendo que metade foi avaliada pela CAPES com nota seis, e a outra metade com nota cinco. Estes cursos foram escolhidos somente entre os programas das áreas biológicas, avaliados por diferentes comissões. A escolha foi por sorteio simples. Nestes cursos foram avaliados, durante o ano de 2000, as respectivas publicações, número total de pesquisadores ligados ao curso, número de publicações completas, número de trabalhos apresentados em congressos e número de pesquisadores orientadores em relação ao número de alunos.

Para se classificar as publicações completas utilizou-se o fator de impacto de cada publicação como definido pelo Journal of Citation Report de 1998. O fator de impacto considera a razão entre o número total de citações de uma revista durante dois anos e o número total de artigos publicados pela mesma revista no ano considerado. Em 1998, cerca de 6.500 revistas de todas as partes do mundo, das áreas biológicas (saúde pública, endocrinologia, nutrologia, medicina de urgência, biologia celular, imunologia, etc.), tiveram o seu fator de impacto calculado.

Por fim, ordenou-se todas as publicações do ano 2000 de cada programa da amostra a partir do fator de impacto das revistas onde publicaram. A seguir construiu-se um histograma considerando os valores de percentis. Assim, a partir da mediana do fator de impacto, dividiu-se a porcentagem de revistas publicadas que estava acima da mediana para cada curso.

Resultados

O Gráfico 2 apresenta o histograma geral da avaliação CAPES, em relação as notas dos programas , agrupados em áreas biológicas, exatas e humanas. O Gráfico 3 apresenta os programas das áreas biológicas que obtiveram nota 1e o Gráfico 4, os programas avaliados com nota 2, contrastando os programas das áreas biológicas com os das demais áreas. Este mesmo contraste, para os programas com notas 6 e 7, é mostrado nos Gráficos 5 e 6, respectivamente. Observe-se que as barras representam o número de programas que receberam determinada nota pelas diferentes comissões avaliadoras.

Dados sobre os 12 programas das áreas biológicas escolhidos aleatoriamente – metade com nota 5 e metade com nota 6 – são mostrados na Tabela 1. Nela comparam-se as seguintes características desses programas: percentagem de pesquisadores orientadores NRD 6 e 7; relação desses docentes com o número de alunos do respectivo programa; relação com a produção no triênio 1998-2000 e relação entre o número de trabalhos completos publicados em 2000 e o número de resumos publicados no mesmo período.

Os Gráficos 7 e 8 representam o desempenho dos cursos com notas 6 e 5, respectivamente, da amostra selecionada quanto ao fator de impacto das publicações no ano 2000.

Discussão

1. Há uma distribuição desigual das notas quando se considera as diferentes comissões de avaliação dos três grupos de áreas analisadas. Nenhum programa de áreas humanas e exatas deu nota 1. Poucos cursos destas áreas foram avaliadas com nota 2. Por outro lado, observa-se um nítido predomínio de notas 6 e 7 nessas mesmas áreas.

2. Dentro das áreas biológicas a atribuição de notas não é homogênea quando se considera as publicações com reconhecimento internacional e com fator de impacto. Existem programas com número muito reduzido de publicações e outros com grande número de publicações, todos com a mesma nota.

3. Também não pode ser considerado uniforme o número de publicações – trabalhos completos e resumos – quando relacionado com o número de docentes orientadores. Cursos com mesma nota, 5 ou 6, apresentam sensíveis diferenças quando se compara o número de trabalhos completos por orientadores NRD6/7.

4. Cursos com um grande número de resumos apresentados/publicados têm um pequeno número de trabalhos completos, e o fator de impacto das respectivas publicações completas é menor.

5. Sugestões para diminuir a heterogenia das avaliações
   5.1 Atribuir nota de 1 a 5 aos programas, segundo os critérios das áreas, levando em conta coerência, infra-estrutura, capacidade de formação, bom tempo de formação e produção científica.
   5.2 Os programas com doutorado e nota 5 podem, após uma segunda análise e se tiverem desempenho em nível internacional, obter notas 6 ou 7.
   5.3 O desempenho em nível internacional refere-se, principalmente, à produção científica, cultural, artística ou tecnológica dos programas, levando-se em conta, ainda, a competitividade com programas similares de qualidade no exterior e demonstrações evidentes de que o corpo docente desempenha papel de liderança e representatividade na sua comunidade.
   5.4 Valorizar a produção intelectual, além de intercâmbios, convênios, programas de cooperação acadêmica e científica, participação em eventos de relevância na área, exercício de funções editoriais, participação de alunos estrangeiros.
6. Homogenização da produção científica em nível internacional
   6.1. Todas as áreas devem especificar o que é produção de conhecimento nos seus campos de atuação (trabalhos, livros, capítulos de livros, patentes e quaisquer outros), dentro da característica de cada área (biológicas, exatas, humanas). Feito isto, devem avaliar o quanto dessa produção está em nível internacional.
   6.2. O Conselho Técnico-Científico (CTC) da CAPES pode estabelecer que, quanto à produção científica, as notas 6 são atribuídas quando 80% do corpo docente, em conjunto, produzir conhecimento em nível internacional, com 3 publicações por triênio em média. A nota 7 é para os programas com 90% de orientadores com no mínimo 3 publicações internacionais por triênio. É fundamental ressaltar que a avaliação é sempre comparada à produção internacional da área. Fica evidente que todos os programas também devem obedecer a outros pontos de excelência internacional, que são comuns às áreas. Assim os programas 6 e 7 deverão obrigatoriamente buscar a comparação internacional, sem fronteiras. Com isso fica respeitada a característica de cada área quanto à produção científica, porém todos só contarão para 6 e 7 com sua produção internacional.
   6.3 Sem essas deliberações é possível que o corporativismo de comissões de áreas banalize os conceitos 6 e 7, desacreditando a avaliação e fazendo que nova escala de notas seja criada.

Gráfico 1
Número de Publicações Completas do Departamento de Clínica Médica da Faculdade de Medicina de Botucatu/Unesp e Relação com a Implantação da Pós-graduação

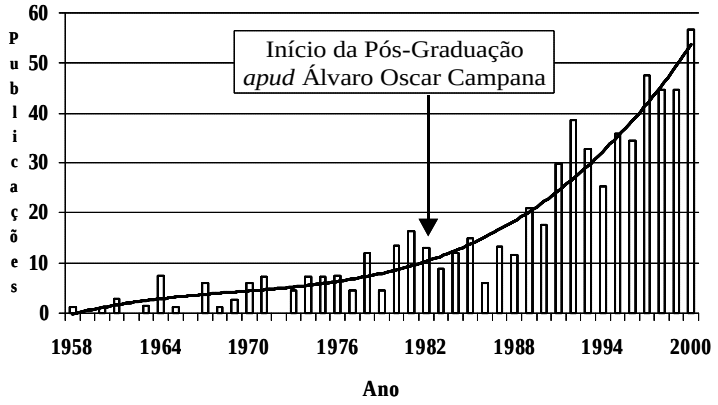


Gráfico 2
Distribuição Porcentual de Notas CAPES Atribuídas no Triênio 1998-2000 aos Diferentes Programas de Pós-graduação Brasileiros, Agrupados em Ciências Humanas, Exatas e Biológicas

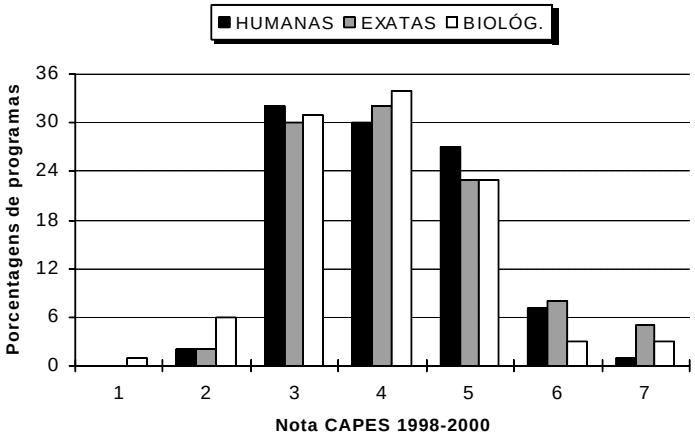
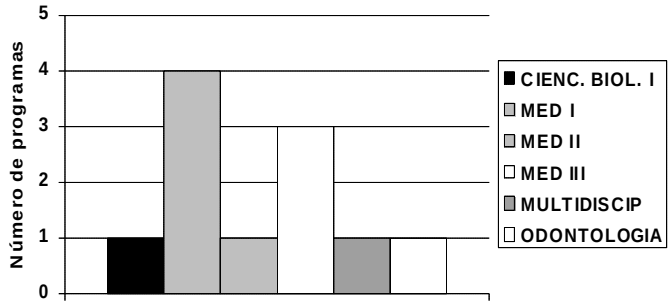
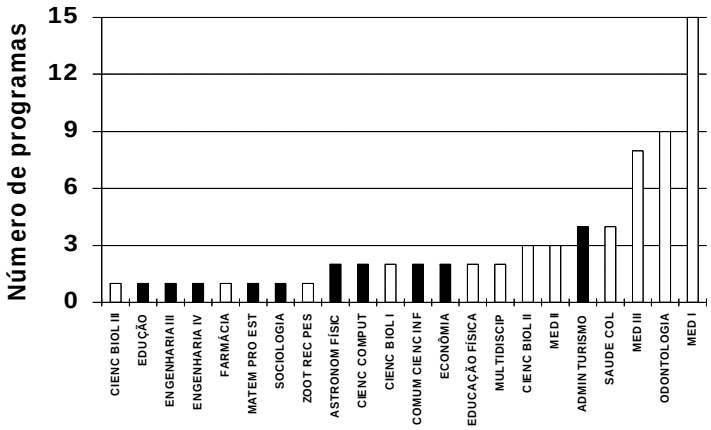


Gráfico 3
Número de Programas de Diferentes Comissões de Avaliação, do Grupo de Áreas Biológicas, que Obtiveram Nota 1 na Avaliação CAPES 1998-2000



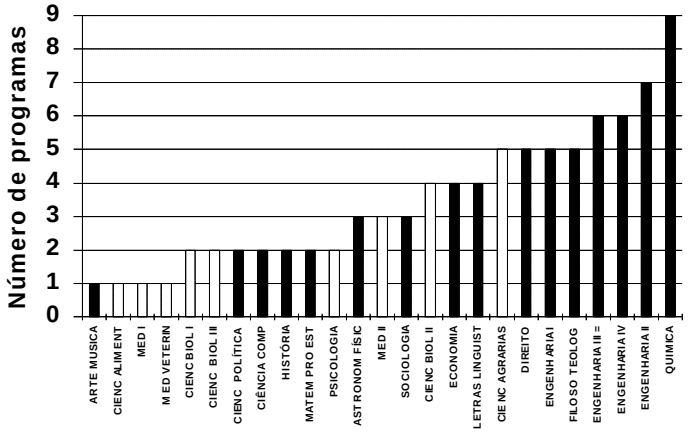
Programas de Áreas Biológicas

Gráfico 4
Número de Programas de Diferentes Comissões de Avaliação que Obtiveram Nota 2 na Avaliação CAPES 1998-2000



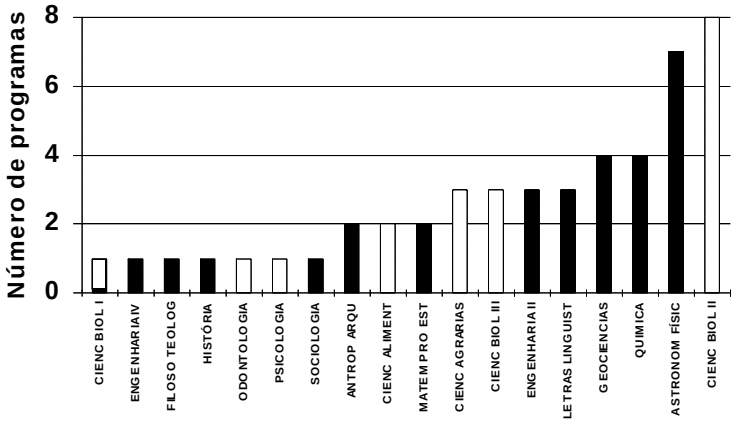
Observação: As barras brancas representam programas do grupo de ciências biológicas.

Gráfico 5
Número de Programas de Diferentes Comissões de Avaliação que Obtiveram Nota 6 na Avaliação CAPES 1998-2000



Observação: As barras brancas representam programas do grupo de ciências biológicas.

Gráfico 6
Número de Programas de Diferentes Comissões de Avaliação que Obtiveram Nota 7 na Avaliação CAPES 1998-2000



Observação: As barras brancas representam programas do grupo de ciências biológicas.

Tabela 1
Comparação de Diferentes Aspectos de Doze Programas das Ciências Biológicas com Notas 6 e 5 - Ano 2000

Avaliação CAPES triênio 1998-200

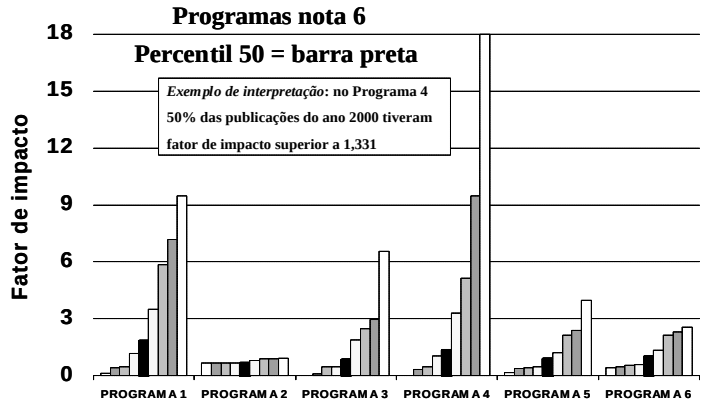
Nota 6									**Nota 5**			
Programas	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
% NRD6-7	55	93	41	68	74	95	67	73	79	67	52	59
Aluno/NRD6-7	3,4	8,4	4,6	4,1	9,4	8,3	5,2	6,7	5,0	5,8	7,6	9,9
Comp/NRD6-7	3,50	0,38	3,63	3,06	1,00	2,08	2,10	0,25	2,06	0,06	1,62	0,50
Res./comp.	2,54	13,67	3,38	3,25	0,62	3,04	2,33	55,17	4,50	187	4,94	19,50

Legenda:

1. % NRD6-7: porcentagem de orientadores dos programas com dedicação superior a 30%, aposentados ou não.
2. Aluno/NRD6-7: relação entre o número de alunos do programa e o número de NRD6-7.
3. Comp./NRD6-7: número de trabalhos completos publicados no ano 2000 em relação ao número de NRD6-7.
4. Res./comp.: relação entre o número de trabalhos completos publicados em 2000 e o número de resumos apresentados/publicados no mesmo período.

Gráfico 7

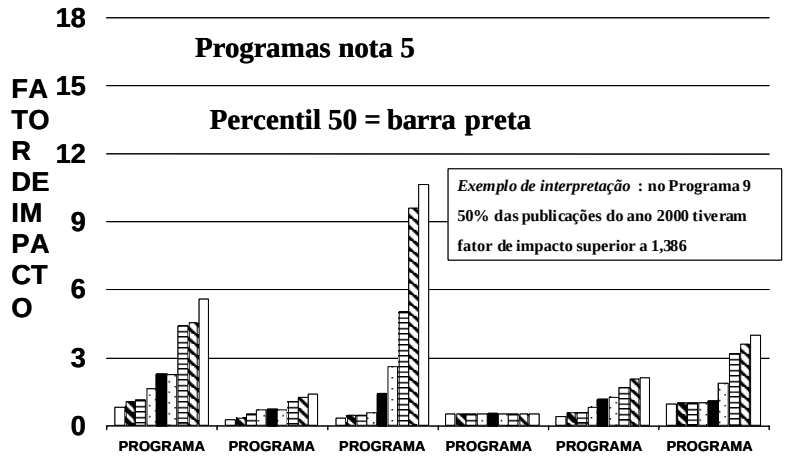
Distribuição das Publicações dos Programas da Amostra com Nota 6, segundo o Fator de Impacto das Publicações – Ano 2000



A barra preta representa a mediana (percentil 50)

Gráfico 8

Distribuição das Publicações dos Programas da Amostra com Nota 5, segundo o Fator de Impacto das Publicações – Ano 2000



A barra preta representa a mediana (percentil 50)

Avaliação internacional da pós-graduação

Engenharias

Durante a semana de 13 a 17 de março de 2000, a CAPES empreendeu a Avaliação Internacional da Pós-graduação na grande área das Engenharias. Para tanto, 14 consultores estrangeiros, de reconhecida atuação no ensino e na pesquisa em suas áreas, empreenderam visitas aos programas que receberam nota 6 na Avaliação de 1998 (não foram atribuídas notas 7 na área). O objetivo da avaliação internacional é o de verificar a adequação dos conceitos de excelência (6 e 7) aos padrões internacionais. Os relatórios originais e um resumo traduzido são publicados abaixo.

1º grupo
Consultores
Janie Fouke, Universidade do Estado de Michigan, EUA
Wilfrid Hofmann, Universidade Técnica de Chemnitz, Alemanha

Programas visitados
Eng. Elétrica, PUC-Rio
Eng. Biomédica, UFRJ
Eng. Elétrica, UFPB

Electrical Engineering -- PUC-Rio

As part of continued assessment of the graduate programs of Brazil, CAPES organized a review of the programs by an international team of experts. Following is the report from that team.

Faculty qualifications

We reviewed an abbreviated version of the curriculum vitae of the faculty members and found that their credentials were respectable and at a level appropriate for an institution of higher education. Many of the Ph.D.s have had international academic experiences, both in term of their graduate degrees and from exchange programs. Therefore, they know the usual expectations and requirements demanded from a graduate level electrical engineering students. On the other hand, we could find no evidence that the faculty members have direct experience with or practical exposure to industry. Further, 25 of the 35 faculty members are 10 years past Ph.D., making this the oldest faculty that this team assessed. As later noted, there is some distance between the research projects and the needs of industry and this may be due to the lack of exposure of the faculty to industry problems. We found the communications group and the control theory group to be especially strong. By the same token, there are not enough well trained members of either the microwave group or the optoelectronics group. Careful thought should precede future investments in these areas.

Faculty dedication to:

a) Teaching

Faculty course load is evenly divided between graduate and undergraduate education. All of them teach undergraduates and most of them also teach graduate students. It is usual to give about 4h or 3h per week for lectures in undergraduate or graduate courses. Several lecturers, especially the younger ones, demonstrated a common interest in the application of more modern methods for teaching. As an example, there was widespread use of the Internet, especially in the computational intelligence group. These methods should also be applied in the curriculum and activities of the other lecturers.

b) Research

The research activities have a high priority in the daily work of the faculty. Projects are initiated which are expected to extend over relatively long time periods with continual progress being reported to the sponsors. Even so, it could be seen that production of papers has the absolute priority. (One of the faculty answered my question: "how does one become a titular professor" with the response "you have to make tons of papers"). The publication rate of the faculty is a bit low. Considering that the conference presentation rate is quite high, one would expect a bit more from this group of researchers.

c) Advising activities

The faculty place a high importance on advising and one can tell this from the way that they allocate their time. Unlike the situation in some European institutions where the full professors have the responsibility for advising the Ph.D. candidates, this supervising function is also the responsibility of associate and assistant professors. The balance between Ph.D. and M.Sc. students is good with a strong emphasis on the former.

Relevance of

a) Themes for thesis

We reviewed abstracts of some of the doctoral theses and recognize that the ones that we reviewed might not be representation of the entire collection. Nonetheless, from what we have seen we would say that dissertations from the Computational Intelligence Group and, to a lesser degree the Applied Electromagnetic and the Communication Systems Group, have relevance in the international scientific community. This did not appear to be the case with the selected Ph.D. theses from the Power Systems and the Control Theory Group. In this case, they had more local importance and were not as fundamental.

b) Research projects

In general, we found the most research projects have either an immediate practical application or a short-term potential for a practical application. This may be due to the fact that many of the projects are supported by industry or national agencies. The Computer Intelligence Group has a breadth of projects applying their neural networks and related techniques that was refreshing. The research projects in Power System Distribution Group are vital to the nation. In the case of the companies, the sponsorship comes in many forms including tuition for employees while they pursue their degrees, gifts of equipment or consulting jobs for the faculty. The co-operation between the university and the industries should continue to be emphasized and will contribute to an enhanced national and international reputation of the institution.

Scientific quality of local themes

A high level of scientific quality was noted.

Condition for forming an advanced researcher

The conditions for developing and advancing the career of a young researcher are the best in Brazil from what we have seen in this area. In particular we cite, the 24 hours access to the laboratories, the qualifications of the lecturers, the sophistication of the computer facilities, and, to some degree, the quality of the laboratory equipment. There is excellent collaboration between and among research groups as evidenced by the intellectual cross-fertilization between projects. The students showed several examples of this.

Attractiveness of the graduate program

a) For students

The graduate program is well designed. One-third of the Ph.D. candidates come from other national universities and are trying to complete their degrees to raise the standard on their campus. The students have the possibility to have information from the different specialists in the institution to exchange ideas about methods, programs and then to adapt their results from this new point of view. There are no jobs for the students though. Some go abroad but industry is not hiring them. Despite this, graduate enrolment is increasing. At least one reason is that the academic market for the Ph.D.'s is good since Brazil wants to increase the quality of the programs at the numerous private universities and that means that they must hire more Ph.D.'s. About 90% of the undergraduates come from Rio and half of the graduate students as well. Other graduate students come from the other states and from other countries in South America. This shows that the program has widespread impact.

b) For researchers

The balance in the graduate program may need some attention. The pure theoretical works are of the highest quality level but the relation to really newest questions was not obvious. This was the case despite the fact that these investigators have (and use) the most modern tools for searching the literature and keeping up with the international publications. This could become a problem for attracting researchers abroad to spend their time at PUC-Rio. The impact of the change in value of the currency is enormous both with respect to the ability of the institution to attract visitors and for any encounter with other countries such as the purchase of equipment for the research.

Professional status

We found the research work to be of a professional nature.

Infrastructure

a) Laboratories

The quality of the equipment in the laboratories was uneven. In most cases it consists only of computer facilities and software tools for calculations or simulations. This is similar to international standards for these types of work. For the experimental labs, such as the

optoelectronics lab or the semiconductor lab, the equipment is nearly as good by international standards as what one would find in other adequately equipped labs. In other research groups this was not the case and the labs were not closely comparable with what one would find abroad and investments are required to bring this up to a minimum standard. This will probably require a balance between public development programs and industry investment.

b) Library

The library of the department is in a very good state. The newest periodicals are available despite the substantial cost of providing them.

c) Computer facilities

There are substantial numbers of adequately outfitted computers that are easily accessible to both students and faculty.

d) Student support

Currently CAPES and CNPq provide support for 35 Ph.D. graduate students and 48 M.Sc. students.

Scientific exchange

a) National

Undergraduate and graduate students come from all over the regions and find here very good conditions for study and satisfying the requirements for a M.Sc. or Ph.D. thesis.

b) International

There is ample opportunity for international exchange. We observed a high level of connections to the international scientific community and access to the newest information. These help to increase the reputation of the institution, of the faculty and of the students. We particularly observed this in the optoelectronics group where students and graduates are coming from abroad to spend some months of study.

Financial support

a) For personnel

The financial support has been reduced during the last years therefore the department will be more dependent on graduate training programs such as those made available from CAPES CNPq.

b) For facilities

From the given situation it can be concluded that not enough money for facilities like prototypes, models and experimental set-ups is available. This explains why the investigators

work mostly in computer-aided topics: Control Theory, Communication Systems, and Power Systems Groups.

c) For other investments

There appears to be limited money for further investments

Suggestions

None noted.

Final judgement

I. The quality of the theses that we reviewed, while not uniform, had many elements that are compatible with high quality graduate programs.
II. Few of the faculty members play leadership roles in the national community and only one in the international one.
III. The theoretical aspect of the scientific enterprise is on a high level and is clearly competitive at the international level. The technology is not as uniformly superior.
IV. This program is comparable to similar international high quality programs.

Biomedical Engineering – UFRJ

In the spirit of continuing improvement and assessment of the graduate programs of Brazil, CAPES invited an international evaluative group to visit the program. This report is the result of that review.

Faculty qualification

All of the faculty members have engineering degrees from competitive institutions, some from abroad (US, GB, Sweden) and some from Coppe in Brazil. There do no appear to be people with primary degrees in medicine or biology within the department. While this is not unusual for a biomedical engineering program, strong collaborations with such people is necessary to guarantee interdisciplinary co-operation in this special field.

Faculty dedication to

a) Teaching

Faculties represented to the evaluation team that they are dedicated to teaching in a balance that is appropriate for a major research institution, one with no graduate program. The courses are made stronger by modern teaching tools such as computer animation, videotapes and experimental demonstrations. The relationship between the theoretical and practical aspects of the lessons is 1 to 1 and such proportion is admirable. The students are in agreement that most of the teachers are knowledgeable and capable in the classroom. There is a substantial attempt to expose the students to a wide range of topics and sometimes they think they miss a better context between the single lessons. Perhaps a better planing of the time schedule or the context for individual lessons should be considered. The students think some of the faculty members are “outstanding” or “excellent”. The quality of seminars have been outlined by the students.

b) Research

The research environment for all of the groups was good or very good for the faculty. The students, especially the ones who are currently working on their M.Sc. or Ph.D. thesis, appreciate the dynamic style of their supervisors. We wondered about the very low number of visiting professors (1 in last 3 years) because it seems to be a terrific place to come for a sabbatical. We were not provided data on visitors who came for shorter periods. Even so, the students independently reported that they have frequent encounters with visitors from other countries.

c) Advising activities

The students seem to get lot of help and support. Resources for the graduates include such supplemental material as course packs or handouts, books from abroad, and foils downloaded from the Internet. Especially during the first semesters the variation between the courses is quite wide and the additional material helps even out the considerably broad background of the entering students.

Relevance of

a) Themes for thesis

Many of the projects directly address themes that are relevant from the national point of view. Contacts with industries are the sources of many of the projects. This is good because it provides resources for graduate students and for equipment. In addition, quite a few of the projects are founded in basic inquiry that has international relevance and is a little more removed from immediate practice. Such a balanced portfolio of basic and applied research, of short-term and long-term projects, is critical for a healthy graduate program.

b) Research projects

Most of the research projects are followed from industrial background but they are from a typical local colour. Some of the faculty should be encouraged to publish more manuscripts (certainly their conference publication rate indicates that they could be publishing more!) and more frequently in international journals. This will aid in the international recognition of the school, the department, and the individual faculty members.

Scientific quality of local themes

The scientific quality is excellent. Much of their work is related to the practical use of experimental set-ups in the university, in hospitals or in companies. Experiments on animals or humans are not typical as part of the student training, but human data frequently represents the origin of a thesis question. In this case, the understanding of the experimental set-up and the measurement protocols are shared with the other students and become a method for cross-disciplinary exposure of the students.

Condition for forming an advanced researcher

The conditions for training graduate students are adequate but the equipment for the labs could be improved and enlarged in someone cases to reach international standards. The flavour of the research is frequently influenced by the local financial base which is not as strong in the relevant industries as in some others in Brazil. Therefore we observe the type of improvisation in

the laboratory that occurs all over the world where financial resources are limited. We do not believe this to be detrimental to the education of the students. On the contrary, it may imbue them with an innovative capability that boundless resources would suppress.

Attractiveness of the graduate program

a) For students

The graduate program is surely attractive for students from Brazil and from other continental countries. From 100 applicants, only 25 are selected for admission. Most of these enrol as the admission process takes several months and has the unique feature of requiring "pre-tests", enhanced educational responsibilities to broaden the background of the students (the "levelling" course) and then "post-tests". The students who ultimately are invited to the program are therefore quite strong and essentially all of them are financially supported if they are eligible. The drop out rate is low. The students report that the exchange between the engineering and medical disciplines is very good.

One particularly attractive feature of this program is the clinical engineering exposure that is so necessary to hospitals. As noted below, it may not be the best use of the resources of a research program, but it is vital nonetheless. It is likely that this type of training could be exported to certain countries in Africa and Asia.

About 80% of the students go on to academic positions with the remaining going to industrial positions. The demand for Ph.D. graduates in Brazil is substantial as the private schools are being encouraged to up-grade their programs. Some of the job opportunities are driven by the economy. For instance, when the economy is good, the person who trained in biological signal processing will jump to the telecommunications industry. Some students leave their education to take jobs, sometimes making the duration of their academic program much longer. This may be one of the reasons that the students are older than the typical engineering students in Brazil.

b) For researchers

The clinical engineering program could be also enlarged for researchers who come from industries or medical services for taking "refresher" courses. The environment for researchers is attractive and the cross-communication among the different research groups is strong. Some investigators suggested that the level of co-operation from industry is low and while this may be true by international standards, from what we saw in Brazil, it was competitive. The demand from the public health sector for informatics is quite strong so the curriculum meets national needs.

Professional status

The professional status of the department concerning more the scientific work than less the practical side is very well established. The department is highly respected both within the country and abroad. More solid collaborations with some specialists from medical schools, from departments of natural science especially biology and from hospitals, will advance this credibility even more. The faculty is much more successful at transferring knowledge than in transferring technology. They are quite concerned about the difficulty (and expense) in obtaining international patents and correctly recognize that a Brazil-only patent does not have much value where companies are not manufacturing locally. Further, the assessment of investigators (even engineering faculty) focuses on measures of productivity such as Ph.D. students and publications and not so much on patents. Their web page is causing a substantial increase in their visibility.

The department could perform a vital service to the nation by playing a role in the establishment of clinical engineering standards. It is desperately needed. On the other hand, one has to question whether or not this is an appropriate activity for a research and graduate training program.

Infrastructure

a) Laboratories

The laboratories appear to be adequately equipped and the investigators were proud to show them off. In addition, there were students throughout who clearly were responsible for much of the equipment. There did not to appear to be any unusual or particularly expensive equipment and much of it was improvised. Nonetheless, the investigators appeared to be not limited by it. There were labs for electro-optics, signal processing, informatics, pulmonary engineering and ultrasound measurements.

b) Library

We saw many textbooks from all over the world and we were given to understand that current journals are sufficiently available. We did not go to the main library and this department did not duplicate those resources in a private library of its own.

c) Computer facilities

Computer facilities were adequate. Unlike many labs where the computers were not dedicated to equipment control, many of these computers had that as an added function. Internet access was throughout the buildings.

Scientific exchange

a) National

National exchange exists in collaboration and competition with other biomedical departments in Brazil. In addition, they have much in common with faculties from electrical and computer engineering departments.

b) International

While the investigators make presentation at conferences all over the world, we could find no evidence that they use that opportunity to serve as visiting on nearby campuses. Nor could we find much evidence of visitors from other countries visiting the campus. This is unfortunate since this is a lively group of interesting investigators with labs that could lend themselves to the execution of projects by visitors. The students reported that lots of people visits for short periods of time.

Financial support

a) For personnel

It is adequate to that what is usual in Brazil. The grants coming from other institutions (BMST, CAPES, NAO, IAC) or organisations from abroad (EC, BC) for the graduate program

are very distributed and are typically shared with other departments. The needs could not be satisfied at the moment.

b) For facilities

The invested money for facilities is not sufficient to have a top quality modern lab. Some of the needs include labs for testing and service and it is difficult to find resources for these types of non-research activities.

c) For other investments

For improving the research, it is necessary to create a special investment program for special facilities, measurement instrumentation and medical set-ups.

Suggestions

- Get external advice about the wisdom of maintaining a clinical engineering activity or about getting the government or the hospitals to pay independently for the service
- Strengthen communication and collaboration between medical and engineering faculties

Final judgement

- The high quality of the theses and other products of the scientific enterprise have been demonstrated through frequent international publications including at least 2 prize/award-winning papers and one invited paper.
- Many members of the faculty are engaged in support of their own national community. Their work is more important for national clinical services than for research and international competition.
- Scientific production is competitive with the international standard, but it is not uniformly distributed among the members of faculty. The technology is not as uniformly superior.
- Compared with similar international programs, this program is competitive and attains a high scientific level.

Electrical Engineering -- UFPB

In order to continually assess the quality of the graduate programs in Brazil, CAPES organised an external review by a team of international experts. This report is the result of that review.

Faculty qualification

After reviewing an abbreviated version of the resumes of the faculty, we conclude that the pure scientific qualifications of them can be assessed as competitive by international standards. This is with respect to their training. Following discussions with them, we felt that some deficiency in engineering exists as compared to typical faculty from institutions abroad. There is a concern that three of the last four faculty members who were hired are UFPB graduates. This is

not a good trend. Such inbreeding and the lack of fertilisation and approaches from other institutions inevitably lead to stagnation.

Faculty dedication to

a) Teaching

It was a little difficult to figure out how much time they spend in the classroom but we were left with the impressions that the commitment to teaching is strong and the relevant amount of time devoted to this activity is appropriate and as expected by most lecturers. New and modern types of teaching were not obvious as the teaching style is a classical one. Attention should be paid to the newest tools and techniques in use in the engineering classroom across the world.

b) Research

The choice of research fields is strongly influenced by the accessible international publications. No project was identified as leading edge or at the very front of its field so the sense is that the research activities are following the lead of investigators at other institutions.

Faculty publication rate is approximately 0.5 peer reviewed publications per year and slightly lower in international journals. This is competitive with the rest of Brazil but not competitive with the best universities around the world. Because the infrastructure is very poor and not adequate for the needs of the investigators, many research projects cannot be performed. Therefore the output or results of the investigations is not competitive at an international level.

c) Advising activities

The advising activities are dictated by the research directions. All faculty members teach in graduate and undergraduate courses and also in Ph.D. production. Their work appears to be more local that international.

Relevance of

a) Themes for thesis

The themes of M.Sc.'s and Ph.D.'s theses are mostly relevant from the scientific point of view. The connection to the practical world is not clear. Even though the professors are concentrating on producing students with graduate degrees, the relevance of these engineering accomplishments to the Brazilian economy is not clear.

b) Research projects

The research projects that the students perform are strongly influenced by the interest of the professors. Projects that are sponsored by industry are very rare. The ones that are sponsored by industry do not appear to sit on a scientific foundation. Several Ph.D. projects were described as being motivated by a desire to build something that there were no monies to purchase. This is not scientific inquiry. In addition, we were told about having students build something as a Ph.D. project in order to train people in how to build things. Again, this is not scientific inquiry.

Most topics (aside from power distribution systems) suffer from a lack of connection with industry. We did not see examples of local industry collaborations or the suggestions of projects that local industry would fund. This could be due to a lack of such industry in the immediate environment, nonetheless, an engineering school needs to be connected to industry. Other universities maintain industry contacts with companies that are two hours away by plane.

One of the main reasons for industry connections is for employment of the students. In this case, however, most of the students went to academia so one has to wonder about the market that is being served by this graduate program. Should consideration be given to requiring students to spend some time in an industrial environment as part of their degree program? The professors do offer short courses to industry and this is evidence that they have something (if not students) that industry needs.

c) Scientific quality of local themes

Considering the general lack of facilities and resources, the theoretical work is of good quality and should be praised. We did not find evidence of prize-winning and award-winning papers or of invited papers at conferences. Both of these are evidence of international competitiveness and scientific diligence. The general lack of an experimental/practical arm to these studies may be partly to blame for the lack of international recognition.

Condition for forming an advanced researcher

There is only a limited range opportunity to train advanced researchers because of the provinciality and the lack of resources. We were unable to learn much about the quality of the entering students.

Attractiveness of the graduate program

a) For students

The graduation programme seems to be attractive for the students from Brazil and from neighboured countries but only for them. The admission is about 60%. Further, the drop out rate is extremely high.

Even so, we saw exceptional examples of the integration of undergraduate and graduate education and the linkage between research and education was robust.

b) For researchers

There have been limited exchanges of faculty and visitors from other institutions in the recent past. It is not clear that researchers have come and stayed long enough at the department to finish their own projects.

Professional status

The organising and realisation of research in the department in relation to the Ph.D. qualification can not be assessed as a professional one. There seems to be a lack of rigor in the preparation of the students and too much improvisation.

Infrastructure

a) Laboratories

The labs are in a very poor state. Occasionally a laboratory can be determined to reach an international standard, for example the High Voltage Lab, but this is rare. Even in this case, the infrastructure is not used sufficiently. Furthermore, the visitors found a certain indifference with respect to the to the required carefulness expected in a laboratory. Safety issues should be addressed. There was Internet access in every lab but when we tried it, it was too slow to be functional.

b) Library

The library of the department is used both by M.Sc. and Ph.D. students. The library was short of journals and there were not very many books. Local decisions about which journals to collect are extremely important as decisions made at a higher level may not be appropriate or responsive to the needs of the faculty. While the Internet may provide some relief in terms of easier access to material, there will continue to be a need for investments in these types of resources. The collection of periodicals was incomplete and we did not observe any issues more recent than 1997.

c) Computer facilities

These facilities can be assessed as good although most of the machines were relatively old. We did not observe a relationship between the experimental studies and the computers.

Scientific exchange

a) National

There is communication between this institution and some of the other institutions in Brazil.

b) International

There is evidence of international visitors from several institutions. This may be a result of the many universities and countries (at least six) from which the faulty obtained their degrees. Nonetheless, the depth of this visiting program is questionable and special results (eg. joint papers or advising of students) were not observed.

Financial support

a) For personnel

We did not observe shortages of support staff personnel or faculty but it did appear that additional expenses for technical personnel are necessary. Scholarships are provided from CAPES and CNPq to support 23 M.Sc. and 33 Ph.D. students.

b) For facilities

The experimental equipment budget is inadequate. In general, the equipment available to the students was substandard. The existing equipment was old and there was not very much of it given the sizes of the classes. Further, some types of laboratory experiments are very cheap to outfit yet even these sorts of equipment were missing.

c) For other investments

There is a fundamental lack of equipment in all disciplines. There is a long delay in getting resources to the campuses even after funding is approved.

Suggestions

- Introduction of a financial support for equipment
- Practical courses for graduate students in relevant industrial companies linked by an industrial initialised project
- Entrepreneurial training: theoretical and practical support of students for founding of small companies, especially in the service sector of the economy

Final judgement

- The quality of thesis from the theoretical point of view is compatible with a high quality graduation program. The qualification required that an electrical engineer find and investigate technical solutions could not be demonstrated.
- Some faculty members have a role as representatives in the national community. Their work does not appear to have an impact on or response from the international side until now. It is not sufficient to produce many papers or abstracts: the relevance of the engineering is more important.
- Because the technological background is not strong in some individuals, the sense of scientific production is lost. Therefore it is not competitive with the international standard.
- Very little about this program is comparable with high quality international programs on similar topics.

2º grupo

Consultores

Ignacio Grossmann, Universidade Carnegie Mellon, EUA
Xavier Joulia, Inst. Politécnico de Toulouse, França
Robert Wellek, Fundação Nacional p/ Ciência, EUA

Programas visitados

Eng. de Minas, Metalúrgica e de Materiais, UFRGS
Eng. Química, Unicamp
Eng. Química, UFRJ

Metallurgy Engineering - UFRGS

Introduction

The three person, international review team visited the staff and students of UFRGS Post-Graduate Program in Mining, Metallurgy, and Materials on March 16, 2000 in Porto Alegre. Prior to the visit, the team reviewed and analyzed the statistical information and faculty vita provided by CAPES primarily for the 1996 and 1997 periods. Also presented in this report are comments on some of the situations in 1998 and 1999.

The program have about 20 faculty organized into 13 laboratories in two buildings. The program have about 100 M. Sc. students and 100 Ph. D. students. To date, the programs have graduated 434 Masters and 62 Ph.D. students. The Ph.D. program has grown significantly since 1996, so the productivity of the laboratories should also show strong growth in 1999 and 2000. The initial impression of the team was that the publication quantity in referred journals in 1996 was negligible – and at the level of about 0.5 publications per faculty in 1997.

The review team toured the laboratory and facilities at the Central and Valley UFRGS campuses. We received a general program review-type presentation by representatives of all the staff, asked questions during the presentation, met separately with about 12 graduate student representatives, and toured the key laboratories of the three programs. The presentations and the tours were well organized and helpful, even though the time at the campus was very short. (The key presenters were Telmo Strohaecker, Jair Koppe, Ivan Machado, and Carlos Ferreira.) The team distributed a questionnaire to the UFRGS staff and their written responses helped to focus the faculty description of their individual contributions. The focus of the questionnaire was on issues necessary for international level comparisons.

The technical areas of the UFRGS post graduate programs are clearly important to the development of Brazilian industry and they are supported by industry. The key question presented to the team at the CAPES orientation was how do the Brazilian post-graduate groups compare to their international peers–particularly in developed countries.

Organization Management & University Infrastructure

The team found that the research infrastructure–including buildings, laboratories, and instrumentation–was generally very good and at nearly international standards. This situation is due to strong support from such Brazilian agencies such as Finep and CNPq.

Faculty quality & professional productivities

Publications of Faculty (Journals & Meeting Presentations)

In general, the faculty are very strong in presenting their work at technical meetings, but these presentations bring much less lasting international recognition compared to journal publications. The UFRGS groups have made about 140 meeting presentations in 1996 and 1997.

Publications in technical journals were zero in 1996 and about 11 in 1997. This publication level shows a trajectory of growth: from a very low and unacceptable level in 1996 – to a good level for Brazilian standards – of about 0.6 publications per year per staff in 1997. This quantitative level of journal publications is low for developed countries.

International publications & professional activities.

A number of the journal publications in 1997 were in high quality international journals, but this number was small–about 11. Discussions with the staff indicate that the journal publication level is on the increase in 1998 and 1999. One professor alone has five good international publications in 1999 and has already submitted five in 2000.

Four of the staff serve on editorial boards of technical journals; and while this might appear to be a small number, it is high by international standards.

The staff generally have good participation in international scientific societies and committees. Examples are: Deutsche Keramische Gesellschaft, International Society of Electrochemistry, World Bank Technical Committees, and range to American Society of Mechanical Engineers.

One of the very strong points of the program is the existence of several strong collaborative research projects between UFRGS and international faculty and companies. Particularly strong contacts exist with German university groups–although they also exist with French, US, and other international groups. This collaboration enhances the quality and international standards of the UFRGS research output–and can lead to more international industrial support. However, often the research publications from industrial support does not lead to work on fundamental research topics – likely to lead to high standings in the international research communities. (Also, there is a trend in academic settings in developed countries toward diminishing activity on research related to mining and extractive processing–with a growth in advanced materials related to electronics, biomedical, and optical industries. This means less opportunities for collaboration with academics abroad, but more with their extraction industries.)

Awards (financial & honorific)

The post-graduate staff at UFRGS have a very strong record of support from industrial and Brazilian government agencies–but, it is still subject to the whims of government down-turns in available funds–for example in the past year. The government awards are indicative of high level of Brazilian government acceptance.

Profession & society contributions

The UFRGS staff have a very strong records of research contributions that are relative to the mission of the Brazilian society and industry. They have presented evidence of patents, many original process developments, and technical support of industry. Examples are: development of the technology for continuous casting of steel, modern powder casting techniques, surface modification of Fe-alloys by plasma implementation, patents for commercial patents in the ceramics area–including three in France, significant reduction of mining costs for several Brazilian mining companies, and underwater wet welding processes.

Faculty personality and teamwork

The visiting team was positively impressed by the ability of the three UFRGS groups to work harmoniously toward a common goal. This is impressive in view of the difference in their level of research sophistication, i.e., welding verses surface plasma implantation. A significant number of the staff seemed to be (commendably) concerned with quality improvement, in addition to the relevance of their work to society.

Students

The students were intelligent, lively, and positive in attitude. Like the students in other universities they complained in the time it takes for equipment to be purchased (tight funds) and bureaucratic difficulties (purchases from abroad). The students had no problem with writing articles as a part for the thesis development, nor in writing articles in English.

Thesis Quality

We did not examine the theses in order to determine thesis quality.

Ranking, overall Brazil

Using the CAPES scoring system, the visiting evaluation team gave the group the UFRGS mining, metallurgy, and materials post-graduate group a ranking of 6.0 out of a maximum of 7.0. This ranking took into account local Brazilian factors as well as standards in international developed countries. We feel that the overall UFRGS groups did not merit the rating of 7 at this time, as only one sub-group appeared to merit that highest ranking.

International Standing Comparison

The visiting team felt that the UFRGS mining, metallurgy, and materials post-graduate group was graded as very good, in terms of international standards. It is necessary for a stronger journal publication records to be attained in order that the ranking of excellence be recommended.

Overall summary recommendations

The UFRGS mining, metallurgy, and materials group is very good in terms of the Brazilian academic scene. The visiting team feels that it is important that at least two faculty members in each of the three sub-groups increase their publication records in referred international journals to 3-4 per year.

Chemical Engineering - Unicamp

Introduction

On March 13th 2000, we visited the Chemical Engineering master and Ph.D. program at University of Campinas (Unicamp). After the graduate program presentation, we visited the laboratories and we held a discussion with the faculty staff and the students. In order to judge the international rank of the graduate program, we focused on the following criteria :

- The quality of faculty members
- The quality of thesis
- The scientific production in international journals

- The list of journals of international circulation in which the faculty members are editor or member of the editorial board
- The list of international societies or committees in which the faculty members have served
- The list of external competitive awards or grants that the faculty members have received recently (from government or industry)
- The significant contribution in science, engineering or society at large.

We detail below the different points with some comments and suggestions. The intention is only to give some guidelines to improve the quality and the efficiency of the program, as well as to recommend a ranking in terms of international and national standards. During the overall presentation, we noticed a tendency of the group to emphasize the growth of numbers of students and graduates, and much less about the quality of their research achievements. They were less concerned about increasing the quality of the program in terms of research outcomes, especially at the international level.

Organization Management & University Infrastructure

The graduate program in Chemical Engineering at Unicamp was established in 1980, at the Master level, and in 1989 at the doctorate level. This program is young but a great potential exists. The program covers a large field of Chemical Engineering and is organized in five sub-programs :

- Material Science and Technology (ACCTM)
- Biotechnology Processes (ACDPB)
- Chemical Processes (ACEP)
- Process Engineering
- Chemical Process Systems and Computational Programming (ACSPQ)

While this classification is convenient given the size of the faculty-student ratio in the class room, we felt that the rationale for the organization is not very clear, that there may be duplication of effort, a lack of a coordinated strategic plan, and it may in fact not help to increase the visibility of Unicamp. The terminology used for the last three groups makes it difficult for an outsider to distinguish the difference of the research topics. Also, since there are about 40 research laboratories, almost one per faculty member, it is unclear as to the extent to which all groups are working effectively as a team. The only exception seems to be biotechnology, where we felt that there was a more coherent strategic plan as a group.

During the visit to the laboratories, we were quite impressed by the large number of modern computers and the excellent experimental equipment in the labs.

The number of permanent faculty members is equal to 49 (about 50% women 50% men, due certainly to the youth of the university) for 372 graduate students and only 91 undergraduate students. Unicamp is clearly oriented to graduate program. About 340 Masters and 100 Ph.D.s students have been graduated in this program. The selection of students is essentially made at the master level with a ratio enrolled / applicants varying in the range of 25% - 50%.

Faculty quality

All faculty members hold Ph.D. degrees in the research area of their specific program : 26 from Brazil (in majority at Unicamp) and 23 abroad (USA, UK, Germany, France, and Canada). All faculty are involved in undergraduate teaching. However, it appears that 40% of the faculty

members are not very actively involved in the research program. The supervision and scientific production is mainly concentrated on the most productive 20% of the faculty. We were concerned that some young faculty with very strong training have not published their work for some time, despite availability of very good laboratory equipment. A specific structure for the graduate program, like in the two other programs that we visited (Coppe and UFRGS) might be useful to consider to make sure that every faculty member is encouraged and has a clear role to play. In other words, while all faculty members should be involved in undergraduate teaching, perhaps only part of them should be active in the research program supervising graduate students. It should also be pointed out that it is our impression that the two strongest areas in the department are Biotechnology and Process Systems Engineering.

Publications of faculty (journals & meeting presentations)

During the 1996 / 1997 biennium, this graduate program in Chemical Engineering produced a total number of 71 papers published in international and national journals. In 1999, this scientific production is close to 40. In summary, the average scientific production is 0.8 paper per faculty member which corresponds to a good rank. However, there is no uniform distribution among the faculty members, due to the fact that all are not really involved in the program. There is a tendency to preferentially publish through the proceedings of national and international congresses and other meetings : 151 and 207 articles were published in 1996 and 1997, respectively. In 1999, this number is 100. Fluctuations are due to the fact that the national congress in Brazil is every two years.

International activities & publications

There is a concerted effort to publish work in international journals and the average production is good and increasing, although the quantity is relatively low now. Some of the journals are the best in the area: Chemical Engineering Science, Computers and Chemical Engineering, Journal of the Process Control, Applied Biochemistry and Biotechnology, Journal of Food Science and Technology. However, as already mentioned, there is a tendency to preferentially publish through the proceedings of international congresses.

Professional activities at international level

A significant number of faculty members have a role of leadership and representation in the national and international community, in some specific areas. Good examples of a national activity of Unicamp and of its leadership are the edition of the Brazilian Journal of Chemical Engineering (Prof. Milton Mori) and the organization of the next Brazilian Congress of Chemical Engineering , COBEQ 2000 (Prof.. Rubens Maciel Filho).

Awards (financial & honorific)

The faculty at Unicamp has been very successful in obtaining funding from government organizations in Brazil (CAPES and CNPq) and from state organizations (Finep, Fapesp). Numerous research projects obtained international funding.

Professional & Society Contributions

We were impressed by the very high policy of technology transfer that UNICAMP has (patents, technical services, consulting, software, new technologies) and collaboration with industry.

Thesis quality

The average ratio of student to faculty is appropriate with however a great difference in supervision. For example, two faculty members have forty students under supervision. Generally speaking, the program should try to focus more on quality than on quantity. There are course requirements, qualifying exam (1 for M. S. and 2 for Ph.D.) and one seminar but no process to guarantee the quality of the theses by demanding international publication or communication before the defense. The average duration is two years for masters and four years for Ph.D. This total duration could be, in some cases, reduced by integrating master and Ph.D.

Ranking, overall Brazil

In our assessment, the graduate program at Unicamp has a ranking of 6.0 of a maximum of 7.0. (Our actual ranking was about 5.8, but we rounded the score to the closest integer.) The general quality of the faculty and of the research activities is very good.

International standing comparison

The graduate program at Unicamp meets the requirements to be comparable to a good (+) international program. We believe that greater effort at publication in international journals is necessary in order for this program to fit the profile of excellence of European and North American universities.

General summary recommendation

Most of the faculty members at Unicamp are young and with good potential, and that promises a continuity in the research productivity of the program. However, it is necessary to increase collaborative research within the program in order to have a better research quality and international visibility. One point be to mentioned is the concentration of the research activities and production on only a proportion of the faculty. The efforts of these more productive faculty should continue to be encouraged, and the others should be encouraged to emulate them, perhaps through closer teamwork within and between the sub-groups. Also, it might be well to consider a special program to assist young faculty and the beginning of their career.

Concerning quality of the theses, the main suggestion is that it could be guaranteed by demanding at least one paper in an international journal and one communication in an international congress before defense.

Chemical Engineering - UFRJ

Introduction

We visited the Chemical Engineering Program (PEQ) at Coppe/UFRJ on Tuesday, March 14, 2000. The visit consisted first of an overview of the program given by the chairman, Dr. Claudio Habert. This was followed with an open discussion with the faculty. We then proceeded with a meeting with the students, and a visit to the laboratories. Finally, we collected information and had a brief final discussion with Dr. Habert.

The objective of our visit was to find assess the quality of the program, particularly in regard to its international standing and visibility. For this purpose we have prepared this report in which we report our assessment of the quality of the faculty and quality of the students. We then provide our assessment of the overall ranking in Brazil and its international standing.

Organization management & university infrastructure

The Chemical Engineering Program at Coppe/Universidade Federal do Rio de Janeiro has a long and distinguished history in Brazil. It is the first graduate program that was established in the country in that area. It was founded in 1963 by Alberto Luis Coimbra as the first department of Coppe, which is a multidisciplinary graduate program in engineering. The PEQ program has granted more than 600 degrees (500 M.Sc. and 100 Ph.D.).

The Chemical Engineering Program has 17 faculty members of which 4 are women. The PEQ program has 20 staff for technical support, 9 for administrative support and 3 associate researchers. The areas of research are Catalysis and Kinetics, Modeling, Simulation and Control of Chemical Processes, Biotechnological Processes and Environmental Technology, Membrane Separation and Polymers, Particulate Systems, Applied Thermodynamics, and Thermofluidynamics. All the faculty are active in research, and are also involved in undergraduate teaching, which is performed separately at the university in the Department of Biochemical and Chemical Processes. The average teaching load for the faculty has been 2 graduate courses per year (36 hour class), and one undergraduate course per year (45 hours class).

The PEQ program at Coppe has currently about 120 active students enrolled, with about equal numbers of M.Sc. and Ph.D. degrees. The number of degrees granted for the M.Sc. degree has been 20, 14 and 14 for 1997, 1998 and 1999. For the Ph.D. degree it has been 12, 10 and 13. The drop in the M.Sc. degrees was attributed to cuts in the number of scholarships provided by CAPES and CNPq. In March 1997 for M.Sc. students there were 22 scholarships from CAPES and 14 from CNPq (this includes renewal and new). In March 2000 there are now only 18 from CAPES and 9 from CNPq. At the Ph.D. level the numbers have at least remained constant: 11 from CAPES and 36 from CNPq.

The PEQ program is housed in a building that in general has good office and classroom space. The laboratory space, which is about 2000 sq. meters, is housed in two major sites. One is in a newly renovated area occupied by Nucat, the Catalysis and Kinetics group. This area is quite impressive as it is very modern and has state-of-the-art equipment (eg X-ray diffractometer, mass spectometers (UV-IR-FTIR), ESCA, SEM). The other part of the laboratory is in a basement area that is frankly not fitting for a program of this caliber. In fact we were quite surprised to see that the PEQ faculty have been able to perform their research work under such adverse conditions. Fortunately, there is light in sight as the construction of a new laboratory space that is shared with other programs, is nearly completed.

As for libraries we did not visit them, but students did no express any concerns about their limitations. We were told that students have access to several libraries on campus, including the Center of Technology, Petrobras, Cepel and Cetem.

As for computers, on the one hand UFRJ has a J-90 Cray supercomputer. On the other hand students expressed frustrations by not having access to more computers. Also, the current personal computers that they have seem to be somewhat outdated and slow.

Faculty quality

Our team was generally very impressed by the quality of the faculty at Coppe. In fact 16 of the 17 are CNPq scientists. One is member of the Brazilian Academy of Sciences (Martin Schmal). This impression is backed by the following measures.

Publications of faculty (journals & meeting presentations)

The record of journal publications of the PEQ faculty at Coppe is excellent. It is 2.7 journal publications per faculty per year. In 1997 33 papers were published, 53 in 1998, and 48 in in 1999. These numbers are in fact comparable to some of the top 20 departments in the United States. Also, the international journals where faculty have published are generally quite prestigious, for instance, journals such as Fluid Phase Equilibria, Journal of Membrane Science, Industrial Engineering Chemistry Research, Chemical Engineering Science, Applied Catalysis, Computers and Chemical Engineering.

The record of papers presented at national and international meetings is also very strong. In 1997 Coppe presented 101 national papers and 16 international papers. In 1999, they presented 72 national papers and 51 international papers. Also, several of the international conferences where the papers were presented are quite prestigious, for instance, IFAC Symposium and Dynamics and Control, International Zeolite Conference, Symposium on Biotechnology for Fuels and Chemicals, Annual Meeting AIChE.

Professional Activities at International Level

The PEQ faculty have been very active in participating at international activities. A good number of the faculty are members of international associations or committees. A good example of an international activity of Coppe is that they hosted a Workshop on Pan-american Collaboration in August 1998, with the participation of 60 scientists from the USA, Argentina, Chile and few other South American countries. From that workshop the CEPAC organization (Chemical Engineering Pan-american Collaboration) has been established, and Coppe participates in its international website http://cepac,cheme.cmu.edu. In 1999 CEPAC organized two international workshops on catalysis and process systems engineering, in which Coppe had active participation.

Coppe also has strong international collaborations with South America (Santa Fé, Concepción), North America (Berkeley, British Columbia, Northwestern, Notre DameWaterloo, Wisconsin, Pennsylvania), Europe (Caen, Lyon, Twente, Valencia) and Asia (Kyoto). Finally, an interesting project that Coppe has undertaken are courses through the web, which have reached worlwide portuguese speaking audiences.

Awards (financial & honorific)

The faculty at Coppe have bee very successful in obtaining funding from government organizations in Brazil (CNPq and CAPES). This has allowed them for instance to obtain very good experimental equipment, particularly for the catalysis area (Nucat center).

In terms of honors, Coppe has also been quite successful. Examples include first prizes on national research thesis contests, and election of Martin Schmal to the Brazilian Academy of Sciences.

Profession & society contributions

Perhaps the strongest contribution that Coppe has made to Brazil is in terms of the students it has trained. Having pioneered graduate education in Brazil, it has produced many faculty members who teach at other universities. It has also produced many graduates who have been successful in industry.

Other important contributions of Coppe have been the Nucat center which is on collaboration with other institutions in Rio, development of membrane separations for Brazilian applications, and software for parameter estimation and on-line optimization. The PEQ has also good interactions with industry, including Petrobras, Polibrasil, Cargill, Monsanto and Rhodia.

Faculty personality and teamwork

We found the PEQ faculty at Coppe to be a congenial group of people who work very well as a team. They are all very enthusiastic about their research and have high standards. The discussion that we had in the morning was very much like one in a Chemical Engineering Department in the United States.

Student

We had about 45 minute meeting with the students. We were very impressed by them. They all seemed to be very articulate and highly motivated. Several of them had spent part of their studies abroad (Notre Dame, Wisconsin). They mentioned that major reasons for deciding to join Coppe was the excellent reputation of the program, despite the high cost of living in Rio. They were very happy with their professors and thesis work. Only major concern they expressed was frustration with outdated computers and some of the experimental equipment. They mentioned that they think they could do much more if they did not have to struggle with these issues. They also mentioned that it was time consuming to order chemicals or equipment.

Thesis Quality

While we did not examine any Ph.D. thesis, we were impressed by the rule that PEQ has imposed as in our opinion it ensures the quality of the work. The rule is that for a student to graduate they have to have at least one paper accepted at an international journal. They also have to present their work at an international meeting. In that regard, students also mentioned that they often pay out of their pockets a substantial part of their travel expenses.

We were also impressed by the fact that all students were willing to continue writing their thesis in Portuguese, given that it would seem to be easier to write the papers in English and only an abstract and conclusions in Portuguese.

Ranking , Overall Brazil

In our assessment the PEQ program at Coppe is clearly very strong. The quality of the faculty and of the work is very good. While we do not now all the programs in Brazil, it is clear that Coppe must be one of the very top programs in Chemical Engineering. Therefore, we recommend a rating of 7, or 7-.

International Standing Comparison

From our knowledge of Latin America, Coppe is certainly one of top graduate programs. The only other comparable departments are perhaps La Plata, Universidad del Litoral (Santa Fé) and Universidad Nacional del Sur (Bahia Blanca) in Argentina, and UAM-Iztapalapa in Mexico.

While the three of us agreed that Coppe deserves the top mark as a program of international standing, one aspect that hurts them is the poor physical condition of some of their laboratories.

Recommendations

The age distribution of the faculty at Coppe is good. An important future challenge, however, will be to ensure that the young faculty can achieve the same level of accomplishment as the one of some of their prominent senior faculty.

In terms of research, the quality of the work at Coppe is very good. It is also clear that it emphasizes fundamentals. However, to make sure that Coppe strives in the future it needs to examine carefully new areas of research that it should be involved. The area of Biotechnological Processes and Environmental Processes that is perhaps the youngest at Coppe, is a step in the right direction. Also, while industrial interactions seem to be good, we encourage Coppe to continue fostering these relations to ensure the industrial relevance of their work.

Finally, although the new building for laboratories should be completed soon, we urge that the highest priority be given to moving out from the current basement. It is our belief that those labs have inhibited visiting faculty and students from other countries to come to Coppe.

3º grupo

Consultores
Dieter Dinkler, Universidade Técnica de Braunschweig, Alemanha
Peter Hoadley, Universidade Vanderbilt, EUA

Programas visitados
Eng. Civil (Estruturas) e Geotecnia, USP/SC
Eng. Civil, UFRJ
Eng. Civil, PUC/Rio
Geotecnia, UnB.

Introduction

From March 14 through March 17, 2000 the evaluation team visited the M. Sc. and Ph.D. programs in Civil Engineering, Structural Engineering, and Geotechnical Engineering at four universities as follows:

- Structural Engineering , University of São Paulo (USP) at São Carlos
- Geotechnical Engineering, University of São Paulo (USP) at São Carlos
- Civil Engineering, Federal University of Rio de Janeiro (UFRJ)
- Civil Engineering, Catholic University of Rio de Janeiro (PUC/RJ)
- Geotechnical Engineering, University of Brasília (UnB)

The purpose of the visits and evaluations was to determine the quality of each program as each compares with the best graduate programs in the international engineering education arena. In this "arena" the most important factors are: a) the qualifications of the faculty, b) the quality of the M. Sc. thesis and Ph.D. dissertations, c) the quality of the graduate research, and d) the quality of publications in international journals and conference proceedings.

Since the amount of time available to visit each program was usually no more than 3 hours, the evaluation team focused on the above mentioned factors. The team did not have time to visit the library, interview faculty on an individual basis, visit with students, and other related factors. The team was able to conduct extensive visits to the research laboratories in addition to reviewing faculty CV's and reviewing many M. Sc. thesis, Ph.D. dissertations, and publications in international journals and conference proceedings. The team was able to have some conversations with some members of the faculty of each program particularly those faculty who conducted the tours of the research laboratories.

General Observations

In all cases the programs were well prepared and extended every courtesy to the evaluation team. The amount of time available to perform an appropriate evaluation was not sufficient. It is recommended that about 6 to 8 hours be allowed for each visit. The evaluation team had no information about the programs in advance. It would be very helpful if the following was sent to each evaluation team member about 2 weeks before the visit; a) one page CV on each faculty member and, b) information about the program, university, courses, policies, laboratories, and research. Several of the programs that the team visited had prepared a report with most of the information above included. It would have made the visit much more efficient if the team had this information in advance.

The members of the CAPES staff that traveled with the team were excellent. They made our visits, travel, and hotel arrangements very pleasant. Overall the evaluation team had a very pleasant experience.

Geotechnical Engineering Programs.

The evaluation team visited four geotechnical engineering programs. Comments about each one follows.

Geotechnical Engineering, USP-SC

The Geotechnical Engineering Graduate Program at USP-SC has 10 full-time faculty and several contributing faculty. The faculty have excellent qualifications. However, most of them have their Ph.D. degrees from the USP-SC. The evaluation team recommends that the program consider very seriously recruiting future faculty that have their Ph.D. degrees from other universities. On the other hand, the program is to be complimented for sending several current members of the faculty on leaves-of-absence to other international universities to conduct research. The faculty is conducting research in appropriate and important areas of geotechnical engineering. The quality of the M. Sc. thesis, Ph.D. dissertations, and publications in international journals and conference proceedings is excellent. The list of journals in the library is also excellent. The research laboratories appear to be very active in experimental research in important areas of geotechnical engineering. Although we did not have time to visit the experimental field sites, it is an excellent and important activity.

Geotechnical Engineering, UFRJ

The Geotechnical Engineering graduate program at UFRJ is one of three major areas of study in a very large Civil Engineering Department. Unfortunately, the evaluation team was limited to about 2.5 hours for the entire department and barely one-third of this time was devoted to the Geotechnical Engineering Graduate Program. Thus it is nearly impossible to fairly evaluate the program. The faculty appear to be very well qualified. The geotechnical laboratories appear to be old; however, a new laboratory is under construction. The quality of the M. Sc. thesis, Ph.D. dissertations, and publications appear to be excellent. The quality of the experimental research was difficult to determine because of the limited time available for assessment. It would have been very helpful if the publication, written English, entitled, “Graduate School and Research in Engineering – Coppe / UFRJ 2000/2201” had been sent to the evaluation team in advance.

Geotechnical Engineering, PUC-Rio

The Geotechnical Engineering Graduate Program at PUC-Rio is one of two major areas of study in the Civil Engineering Department. The areas of graduate study are appropriate and important areas of investigation. The quality of faculty is outstanding and have been educated at the Ph.D. degree level in several excellent international universities. The quality of the M. Sc. thesis, Ph.D. dissertations, and publications in international journals and conference proceedings is excellent. The geotechnical laboratory is very cramped and small but the quality of the equipment is excellent. Much of the equipment was constructed by the program faculty, students, and technicians; and much of it is unique and of very high quality. The geotechnical experimental research program desperately needs more space in order to continue their most excellent program.

Geotechnical Engineering, UnB

The Geotechnical Engineering Graduate Program at UnB has 9 full-time faculty, trained at several excellent international universities. The quality of this faculty is excellent. Although the time devoted to thesis, dissertations, and publications was brief they appeared to be excellent in quality. The graduate research appeared to be primarily analytical in nature and excellent in quality. The laboratory spaces in geotechnical engineering appeared to be under-utilized.

Although a few research projects seemed to be active. Collectively, the equipment in the geotechnical engineering laboratory appeared to be very conventional.

Conclusions

In general the evaluation team was very impressed with the graduate programs in geotechnical engineering that were visited. The team wished it had more time to spend with each program to give it a good and fair evaluation. If the team had some of the written material in advance, the limited time on site could have been more productive and efficient.

Respectfully submitted;

Peter G. Hoadley, Professor of Civil Engineering Vanderbilt University,
Nashville, TN, USA
March 17, 2000

External evaluation of graduate programs for CAPES

Geotechnical Engineering Program at University of São Paulo (USP), at São Carlos
Civil Engineering Program at Federal University of Rio de Janeiro (UFRJ)
Civil Engineering Program at Catholic University of Rio de Janeiro (PUC-RIO)

General remarks

The evaluation deals with some well established M.Sc. and Ph.D. programs in structural and geotechnical engineering. The programs are offering education and research on a high scientific level. Each of them has its own specialities, which makes it partly difficult to compare them to each other.

The duration of M.Sc. and Ph.D. degrees seems to be in good order, since two-year terms for the M.Sc. and four- year terms for the Ph.D. degree are established. M.Sc. programs require, in general, 12-15 lecture hours per week during the first year. During the second year the M.Sc.-thesis is conducted. This program is comparable to international standards. Nonetheless, a one year thesis is only necessary, if research work is required for the master's degree. It should be discussed, whether a design project of a shorter period related to an application would be advantage for practice orientated engineers.

In the future it could be more important to be able to adapt oneself to new fields, than to be specialized very deeply into a single area of knowledge. This could be achieved by an extension of lecture work during the first year.

Evaluation procedure and general observations

The assessment of different programs took place, focussing the work on the following topics:

- Is the master degree comparable to international standards of the same level and importance?
- Is the Ph.D. program and the quality of dissertations at the same level as internationally required?

- Is the scientific production similar to other advanced societies?
- Is the collection and quality of the faculty comparable to internationally well known faculties?

All programs have shown a quality of master's thesis, that are directly comparable to international standards. This means that the goal to introduce an educational system in Brazil that is able to give opportunity to its citizens to achieve international engineering levels is reached.

The Ph.D. programs require in general 4 courses of further scientific study partly on a higher scientific level than the master courses. The themes of the dissertations are actual and of general interest, partly related to local problems as sanitary landfills, soil investigations, hydraulics and research initiated by the oil industry.

Reviewing of some completed Ph.D. theses show a proper kind of scientific work, which develop mechanical models and mathematical algorithms on international levels.

The production of publishing scientific work in international journals is generally increasing, but not by all faculty members. The preferred journals are in general well known and of high international standards. Differences were found with respect to the areas of knowledge, where publications in computational mechanics are widely distributed, but not necessarily in other areas of civil engineering.

Related to the history of different programs, the faculties did not develop in the same way. Some faculties exist, where almost all members received their M.Sc. and Ph.D. at the same university where they now teach. Other faculties selected their members from applicants, that received their Ph.D. and even their M.Sc. abroad. A few faculty members continuously visit other countries for research projects and sabbatical leaves. It has to be mentioned, that it is common practice in Europe and the United States to change universities to get permanent positions and to exchange knowledge as research fellows and visiting professors. This practice seems to be important, since it could establish joint research projects and student exchange programs. Furthermore, it is necessary to develop abilities for international leadership in different areas of knowledge, where contacts and willingness to work together is important. This property does not belong to every member of the visited faculties.

Evaluation of Structural Engineering Programs

USP - São Carlos

The program is well established and developed. The collection of areas of knowledge is nearly complete with respect to structural engineering. The scientific production achieves partly high international standards, indicated by the number of scientific papers published in international journals. A few members of the faculty seem to be able to have a significant role of national leadership and international representativeness in their area of knowledge.

Problem of the faculty may be, that almost all of them made their M.Sc. and Ph.D. degrees at USP-SC and only a few went abroad for post-doctorate study. Further problems may arise, since the faculty is not able to offer new positions to young and promising researchers. A few contacts to foreign research groups exist and some exchange ideas. In general, the number of projects from industry and reviewed research proposals should be increased.

UFRJ – Coppe

The Civil Engineering Department is well established and developed, although the visited divisions of structural engineering, geotechnical engineering and water resources seem to have different quality and importance. The computational mechanics group conducts with research projects on a high scientific level, which is without doubt comparable to international standards. Research Projects are initiated and funded by industry, which is a great contribution to the development of the department and which help to improve equipment and to develop new research areas. Some research areas are interdisciplinary projects of high importance for the future.

The faculty should be developing itself in a way that more members have got international research experiences on Ph.D. and post-doctorate levels. Some faculty members have a role of national and international leadership in their area of knowledge.

PUC - Rio

The faculty of the civil engineering program has experience and knowledge from many countries of the world. They all made their Ph.D. at well developed institutions in Europe and the United States, which is reason for a rich scientific exchange on M.Sc. and Ph.D. levels.

The scientific work and production is on an international standard, partly on sophisticated topics with creativity and innovation. Projects are funded by different partners from industry and national agencies. Publications in international journals are related to a few members of the faculty, what may be improved in future. Some of the faculty members may have a role of national leadership in their area of knowledge.

Final Remarks

Each of the visited Structural Engineering Program have excellent Msc and Ph.D. programs and a high scientific level in theoretical fields. The scientific work of all programs is comparable with international standards. Experimental investigations and programs in structural engineering could be enforced by projects from industry and applications to national research foundations.

A general problem may exist for most of the faculties, since the creation of new research topics and innovative ideas should not be restricted to the international community, but may be also enforced in Brazil.

Problems in the development of faculties and continuation of scientific work may arise at those programs, where faculties are not able to replace members who have retired. A further problem seems to be the practice that faculties have only permanent positions. A continuous fluctuation should be introduced, for example with short time contracts or post-doctoral-scholarships, in order to renew contents and ideas of education.

Respectfully submitted:

Dr. Dieter Dinkler, Professor
Technical University of Braunschweig – Germany
March 17, 2000

4º grupo

Consultores

Norman C. Beaulieu, Universidade Queens, Kingston, Canadá
Karl-Friedrich Knoche, RWTH Aachen, Alemanha

Programas visitados

Eng. Elétrica, Unicamp
Eng. Elétrica e Eng. Mecânica, USP
Eng. Elétrica, UFSC.

General Remarks

In this evaluation, CAPES requested an external, international assessment of some Brazilian Graduate programs in electrical and mechanical engineering which received scores of 6 in the CAPES national evaluation process. The aims of the assessment were:

1. To compare these programs with high quality programs in North America and Europe.
2. To determine whether the laboratories are appropriate and sufficient to support the teaching and research activities of the programs.
3. To review the CAPES "score" with the institutions in order to validate or contest the score;
4. To assess the general learning and research environments;
5. To determine strong and weak points of the programs.

The visitation program of CAPES had been organized very well. Though the schedule was very tight, it was structured with respect to the necessary transfer of information to the members of the group. Some of the schools (for example, Campinas and UFSC) had organized the visiting program in a straightforward manner and provided the members of the group with well-prepared and valuable additional information. Others, like the electrical engineering faculty of USP, tried to squeeze too many visits of laboratories into the tight program. In any case, there was very little time for internal discussions among the members of the group. This was extremely difficult in São Paulo, where, for whatever reason, the group members had been spread to different hotels.

Our evaluation is based upon the statistical measures of pedagogical and research achievement provided to the members by CAPES, the additional information given by the institutions visited, examples of final examinations transferred to us by the faculty members (electrical engineering only), our impression of the quality of research work in the laboratories shown to us, and discussions with faculty members and with students (except at the University of São Paulo). In the assessment of the three electrical engineering graduate programs, a sampling of graduate course examinations was reviewed with a view to evaluating course content and course level. These samplings were heavily biased towards the areas of communications, mathematics and signal processing to accommodate the expertise of the committee.

Though the academic background of the reviewing members represented different aspects of methodology in engineering education, the conclusions and recommendations are almost identical; differing opinions in some of the evaluations are noted explicitly.

Positive Aspects Common to all Programs

1. In all the programs we evaluated, all full-time faculty members hold a Ph.D. degree or equivalent.
2. There are well organized federal funding agencies, in particular, CAPES and CNPq, that support and promote international caliber research at Brazilian universities.

3. We were impressed by the quality of the laboratory facilities and the library resources at all the institutions. They provide excellent support to the teaching and research activities.
4. There seems to be strong collaboration and interaction among the faculty members in any research area group.
5. All of the programs showed very strong interdisciplinary co-operations, as evidenced by the biomedical activities, for example.
6. The so-called "sandwich fellowships" of CAPES, of which all programs take advantage, allow Brazilian students to train abroad in outstanding institutions. These students, upon return to Brazil, bring back state-of-the-art technical knowledge as well as information and perspectives on alternate academic infrastructures and procedures.
7. Each institution has faculty members who publish their research results in world leading journals.
8. The institutions have an external examiner requirement for the Ph.D. degree.
9. The students appreciate the competence of their advisers and the good relationships between faculty and graduate students; they are satisfied with their programs and their institution.
10. Female students feel that they are being treated with complete equity and respect despite the predominant male tradition of the engineering profession.
11. The institutions encourage student involvement in professional societies.
12. There is a substantial number of foreign students contributing cultural and social diversity to the student populations as well as furthering international profile of the respective institutions.
13. The CAPES scholarship structure as well as the institutions' procedures appear to result in a close and beneficial monitoring of the progress of the scholarship students.

Observed Differences and Opportunities

Additional to the funding through the federal organizations, the universities in the state of São Paulo benefit very much from the state's funding organization Fapesp. This difference impacts faculty salaries and student financial support, both in level and in flexibility. The program in Santa Catarina is disadvantaged relative to the other programs.

Based on a limited sampling of graduate course examinations (electrical engineering), the following observations are offered. The content and the level of difficulty of the reviewed examinations from the electrical engineering program at USP are comparable to the content and level at top foreign universities. Leading-edge material is covered at an advanced graduate level of difficulty. The content and the level the other two universities are comparable to high quality foreign universities.

Weaknesses

While all institutions have publications in the world-leading journals in the respective fields, the number of these in relation to the number of faculty members is significantly less than is the case for leading institutions in North America and Europe. This fact is not a consequence of lacking personal productivity and work ethic of the faculty members, because the quality of the papers is in most of the cases comparable to international standards, but rather a result of significantly greater teaching loads in the Brazilian institutions compared with research oriented North American and European universities. Excessive teaching load is certainly a major impediment of all programs with respect to the research activities of the faculty members. We could not identify substantial possibilities to offset teaching loads with outstanding research activities in any program. Nor is there opportunity for the faculty to benefit from teaching

assistance provided by graduate students allowing the faculty members to devote sufficient time to their research.

Compared with the University of São Paulo and the UFSC, the cooperation between the University of Campinas and industry seems to be less developed. The argument of some staff members, that because of the overwhelming multinational character of the industry in São Paulo the interest in cooperation is considered to be minor from the industrial side, seems to be not very credible, particularly given the fact that exactly the same industry has a rather strong cooperation with USP.

Another weakness - at least from a North American point of view – is the lack of, or low level of, international recognition in terms of fellowships in learned societies (for example, IEEE, the ASME and the IEE). While the educational programs can be considered on a par with high quality foreign universities, one can not credibly argue to a North American audience, that a particular department is "world class" as long as this aspect of international recognition is lacking.

The University of Campinas is commended for having two IEEE fellows as well as two members of the National Academy of Sciences and also an Associate Editor of the world's leading journal in the respective field. However, this is too few for the number of faculty members by comparison to leading foreign universities.

The Federal University of Santa Catarina has neither fellows of learned societies nor members in the National Academy of Sciences, but does have a good number of Senior members of IEEE. In addition, there is an Associate Editor of the leading world journal in the respective field, who furthermore is serving a second term as such. The department has a valid argument based on demographic reasons and on opportunity that it is disadvantaged in achieving this form of international recognition.

The Electrical Engineering Department at São Paulo has two IEEE fellows which is commendable, but too few for the size of the department relative to leading foreign universities.

The Scores

In almost all cases, the faculty wanted to discuss their CAPES score with a view to questioning why their score was not 7. Many faculty members felt that their institution deserved a score of 7 just as much as some programs in humanities, medicine and natural sciences that have obtained CAPES scores of 7; in some cases, anecdotal evidence was offered to support this view.

We have agreed on the following conclusions regarding this, perhaps controversial, issue. On the one hand, if the CAPES score reflects an absolute measure of the ranking of the departments in relation to leading foreign universities, the score of 6 seems appropriate. The reasons for not assigning a score of 7 would be low levels of international recognition as measured by fellowships in learned societies and editorships of leading international journals as well as a lower level of journal publication compared to leading foreign universities. On the other hand, all four educational programs are comparable to the educational programs at high quality foreign universities. On this basis, we would recommend a score of 7 for all four programs, noting the particularly strong academic performance of Campinas and the strong academic-industrial collaborations of Santa Catarina. Furthermore, we are happy to see that the recent history indicates growing excellence at these institutions.

5º grupo

Consultores

M. Lea Rudee, Universidade da Califórnia, San Diego, EUA
Helmut Kaesche, Universidade Erlangen-Nuremberg, Alemanha

Programas visitados

Ciência e Eng. dos Materiais, UFSCar
Eng. Metalúrgica e de Minas, UFMG
Eng. Metalúrgica e de Materiais, UFRJ

We visited the Materials Engineering Program at Federal University of São Carlos (UFSCar), the Mining and Metallurgical Engineering Program at the Federal University of Minas Gerais (UFMG), and the Metallurgical and Materials Engineering Program at the Federal University of Rio de Janeiro (UFRJ). We spent about four hours at each site, March 14-16. Discussing these three program in turn:

UFSCar

Prior to the visit we received in advance the vita of the faculty and a number of abstracts of dissertations and reprints of full papers. This was the most complete advance preparation of the three schools. It might be noted that of the full papers, two actually covered research results obtained in Austin-Texas, and Grenoble-France, apparently by staff members on leave from UFSCar.

During the visit we were very competently introduced to the organization, the size, the structure, and the academic content of the program. The program comprises projects in metallurgy, polymer science and ceramics. Afterwards we had the opportunity to discuss many aspects of these matters with faculty members and students, if only very briefly. We wish to emphasize that for us it was a very interesting and professional interchange of opinions between equal members of the scientific community of Brazil, the US and Germany.

We spent about one hour visiting the laboratories of the three branches of the program. It was a pleasure to see that the experimental equipment is first class almost everywhere by any international standard. There is no doubt that the program at UFSCar is at present extremely well equipped with very modern advanced experimental facilities. As everywhere, the problem will be maintenance costs and future updating of equipment. Maintenance of equipment in Brazil is a particular problem due to the distance from service centers. In discussions with the faculty at UFSCar, the cost of maintenance did not seem to be as big a concern as the time required.

We made a rapid visit to student laboratories, lecture and the like, all of which seemed very good.

In the faculty's view, the greatest impediment to their research is the poor quality of the library and access to international journals, either in print or by electronic means.

We understand that UFSCar, including the engineering program, is in an exceptionally good position with respect to other universities in Brazil due to funding by the state of São Paulo, which we have been informed has better financial resources than other states of Brazil, and is required by its constitution to spend 1% of their resources on research and development. They have a very strong relationship with one company (Alcoa), but do not have many other industrial interactions.

On the whole our impression of what is going on in São Carlos is extremely positive. There is not the least doubt the rating of the program should never be less than 6. If 7 is reserved for programs comparable to the very best in the world, say Materials Science at MIT or the Max Planck for Metallurgy in Stuttgart, then our impression is that 7 is not appropriate. However such a requirement seems too restrictive. If we use as our basis of comparison the average of good schools in both the US and EU in the field, then we are convinced that seven is appropriate. There remains an uncertainty about the definition of the grade seven standard that makes us hesitate in coming to a final recommendation.

UFMG

Our second visit was to the Department of Metallurgical and Materials Engineering at UFMG at Belo Horizonte. Arriving at the department, we were furnished information concerning the faculty and the details of the Graduate Course "Metallurgical and Mining Engineering."

As in São Carlos, the Dean and the Program Coordinator introduced us to the background of past and present developments at UFMG. The emphasis was on the particular aspect that mining and steel making in the Minas Gerais has heavily influenced the range of activities at UFMG for many years.

We would like to make a point that both mineral processing and extractive metallurgy remains an active and important area of research in both Minas Gerais and Rio de Janeiro. These areas of research have almost disappeared in both the USA and Germany, but remain important and active in Canada, Australia, and South Africa. Therefore we are not competent to judge these areas. We note, however, that UFMG is adding newer programs, especially in polymer science and ceramics.

Following the introductions, there was a very lively discussion with the graduate students attending the program concerning similarities and discrepancies of academic education in Brazil and elsewhere. There was unanimous concern about the lengthy number of required courses and the lack of flexibility (at São Carlos, our discussions with the faculty subsumed the time allotted to graduate students, but our impression was that their requirements were similar in length to UFMG).

Next, we visited the laboratories both for undergraduate students and for graduate work. We found they were of high quality and new. We were told, however, that during the last several years the necessary financial support is declining. There is, therefore, the danger the present high quality may be difficult to maintain. Here again the difficulty to service the equipment exists, as was noted previously. This was the number one concern of the UFMG faculty, while in São Carlos, the concern about the library is number one. At UFMG, the library was number two, but still very important. In this context, it was claimed that acquisition of expensive professional journals tends to become an unsolvable problem, and that most fields are distinctly underserved. It should be noted that this situation is dangerous. International scientific competition requires rapid and up to date information about what is going on in science elsewhere.

On the whole, our impression concerning the scientific of the program at UFMG is very positive. There certainly is no question of degrading the program to less than 6. The evaluators tend to favor 7, but they are again uncertain as to the degree of excellence required. There would be a slight tendency of the evaluators to consider São Carlos as perhaps somewhat higher ranked. We utter this opinion with every caution, because the information that can be gained in a four hour visit may not support such fine distinctions.

UFRJ

Our third and final visit was to the Metallurgical and Materials Engineering Program of Coppe, at UFRJ. One of us (HK) has spent a number of weeks at Coppe in 1985, and he is certainly very much impressed by the change of this institution to absolutely modern type of department.

The proceedings were on the whole quite similar to the previous visits: Introduction to the program by the heads of administration and research, followed by the faculty, followed by a meeting with students doing M.Sc. and Ph.D. work respectively, and presentation of extensive written documentation including reprints. During these meetings we learned that in contrast to both São Carlos and Belo Horizonte, where contacts with industrial companies are relatively limited, at UFRJ, Coppe has created "Coppetech" to do industrially sponsored projects within the university, some of which are proprietary. These activities represent a considerable fraction of all of Coppe's undertakings. The advantages gained by Coppe through Coppetech are considerable. On asking were told that this rather large number of industrially supported projects was the result of CPPOE's lengthy high standing in Brazilian engineering.

At Coppe we were introduced to the new concept of "Centers of Excellence" or "Nuclei of Excellence," which are interdisciplinary packages of advanced research activities. We consider these Centers to be a very desirable new development.

Unlike the other two programs we visited, the students at Coppe found the degree requirements reasonable and not overly rigid.

As usual, for about one hour there followed a guided tour through the more important laboratories of which there are many. It seemed that the building space available for Coppe activities far exceeds that of engineering science at Belo Horizonte and São Carlos.

Similar to our previous visits, we found that experimental equipment was excellent. Some rather old machinery might be scrapped. But then it is very interesting to have a look at these almost historic technical items testifying to Coppe's lengthy history. Also some of this old equipment is still doing good work. More importantly, the high quality of more recent equipment is again quite impressive. We particularly admired the surfaces and thin films laboratory as especially well equipped and obviously being very busy doing research work. It appears to be a particularly good example of a Center of Excellence.

The overall result of this third visit is similar to that the previous two, grade 6 goes without debate, and we would tend to suggest 7; once more noting, however, doubts concerning the definition of grade 7 excellence.

Final comments

On the whole our impression is that we have visited three engineering programs of outstanding quality. All are deeply concerned about the lack of modern library resources, and we share these concerns.

Brazil should be congratulated for the recent positive developments at least the three schools that we visited.

Post script

One of us (MLR) suggests that Brazil consider recent developments in the structure of engineering degrees in the USA. Many of the leading schools are adding a terminal masters program optimized for students who wish to work in industry, rather than proceed to the Ph.D. This all course work degree, often containing a few business courses, is labeled, say, Master of Mechanical Engineering, as opposed to the traditional Master of Science in Mechanical Engineering.
It also seems that the time required for the typical M.Sc. and Ph.D. program in engineering in Brazil requires even more time than does a similar program in the USA, and both far exceed the time required in the UK. This means that CAPES, and other funding agencies, must concentrate their limited resources on a smaller total number of students than if a year or two was eliminated from the required time of each student. It was noted that the average age of the faculty at Minas Gerais and Belo Horizonte was younger than a similar departmental faculty in the USA, while the average age of the students was older than their US counterparts.

6º grupo

Consultores
Muzio Gola, Instituto Politécnico de Turim, Itália
Shlomo Carmi, Universidade de Maryland, EUA
Wolfgang Massberg Universidade Ruhr, Bochum, Alemanha

Programas visitados
Eng. Mecânica, UFRJ
Eng. Mecânica, Puc/Rio
Eng. Mecânica, Unicamp
Eng. Mecânica, UFSC

Methodology of evaluation

Following the CAPES presentations on 2000-03-13 the evaluating committee met and decided on the following procedure to be followed at each visit site:

1. A question and answer (Q&A) session with the faculty followed the presentation made by the institution
2. A Q&A session with students (sometimes with some faculty present)
3. The Committee divided into 2 (or 3) groups to optimize the visit efficiency: one member was left behind with the graduate program coordinator to audit the data presented (publications, dissertations, etc.) while the others went on lab and facilities tours
4. Committee met again for debriefing before leaving the campus for the next visit

Teaching, learning and research environment

All programs visited had a good standard of required equipment comparable with mechanical engineering research labs abroad.

Where the funding does not allow to buy the necessary scientific equipment the laboratories make use of their own potential to design and to manufacture this equipment as far as possible. In all institutions visited they have mechanical and electronic service workshops manufacturing necessary components. They also make use of the facilities of faculties from other disciplines to master bottlenecks.

In UFRJ and most of the labs of UFSC a very positive aspect could be realized because of the space conditions: the offices of the professors and the staff are integrated into the labs. This offers a very close contact between all persons involved in the research program: professors, staff, graduate and undergraduate students. Furthermore classes and seminar rooms are available in the lab area. So teaching of theory and analytical methods can be combined with practical experiments. This improves the didactical quality and the motivation of the students and also serves as a recruiting mechanism to attract undergraduate students to Master and then Ph.D. programs. Wherever possible this concept should be realized.

Another positive aspect is the poster demonstration close to the experimental equipment explaining the problem, the theoretical background, the methods applied and the results reached. In many cases it was also described whether there exists any co-operation with industry and how the results may be used in industrial practice.

In all institutions the laboratories looked very clean and kept in an excellent condition. Students working there are very motivated and competent. They confirmed that they normally are not facing bottlenecks as far as the access to their advisors and the availability of experimental equipment and computer capacity are concerned. But from time to time they may run into difficulties if a breakdown of equipment occurs and the repair work is delayed because of missing technicians or funds to give repair orders outside.

In all institutions the academic staff tries to foster industrial contacts. Nevertheless some of the faculties are stronger within theoretical research, others in application oriented research. Both activities are of equal importance for the scientific, economical and social progress of Brazil.

Within the talks with the academic staff and students about their activities the evaluating group was convinced that the international state of the art and specially actual literature survey was well known and taken in to consideration. The references within dissertations, thesis and publications in journals confirmed this.

In all institutions services are offered to industry. Making use of the department's expertise and the equipment available, they offer assistance in trouble shooting, product quality improvement and also in calibration. Thus the faculties can rise additional funds for supplementing or modernizing their equipment and for paying additional technical staff.

UFSC could establish already very intensive co-operations with industry because of the research equipment they have available from financial support they got from abroad.

All institutions keep close contacts to highly reputable institutions in Brazil and abroad.

The results of their activities can be measured not only by the number of outstanding thesis and publications but also by successful scientific co-operations with enterprises leading to better product and process performances and even to new products. This should also be taking into consideration within ranking activities of CAPES.

In all institutions the group of evaluators asked the Master and Ph.D. students why they had decided to do their studies not in another university. The answer was in all cases that the well known reputation of the faculty, the availability of a wide range of fields of studies and the lab facilities and also the existing international contacts had played a deciding role when choosing the university for their postgraduate studies.

On the other side the selection of high qualified students by the faculties is obviously very effective. In average not more than 15 to 20% of those applying for admission will be accepted. The insights our group could gain from student interviews was excellent.

General Recommendations

The campus visits were running on a very tight schedule. In order to facilitate such evaluation visits in the future, it is suggested that a standard self-evaluation instrument (template) be developed by CAPES. Such a document will make it easier for the evaluating team to extract from the database the proper indices and information required.

The self-evaluating document should be sent to the team members about a month in advance of the visit. The standard document could include:

1. List of Ph.D. dissertations by year (defense) and publications (journal and conferences) derived from them. This is in an important indicator of publications in international journals stemming from research work initiated in Brazil.
2. List of publications co-authored with Master and Undergraduate students. This is an important factor when recruiting Ph.D. students.
3. Total research funding for the institution as well as for the specific program visited (e.g. mechanical engineering). This funding should include grants from federal sources, CAPES scholarships and industry.
4. List of major equipment in the laboratories.
5. Develop a methodology to follow alumni careers, after graduation. This should eventually help in curriculum input and fundraising (develop this culture of institutional loyalty).
6. Strategic planning for the institution and each program in it, involving an industrial advisory board.

Final remarks

- goverment agencies like CAPES could foster technology transfer of research outcomes (e.g.by supporting incubators), so that enterpreneurships and commercializations are encouraged amongst faculty, students and industry;
- in order to strenghen the evidence that many faculty members are leaders who have international stature (via publications, conferences etc.), they should also strive to become Fellows of professional societies (e.g. IEEE, ASME, AIChE, etc.), which is prestigious and would also enhance the institutional ranking.

Conclusions

To summarize, the impressions the evaluating group could collect when visiting the faculties and the research facilities for the mechanical engineering Master and Ph.D. programs at UFRJ, PUC, Unicamp and UFSC were comparable and, in all cases, very favorable.

Is the quality of thesis and scientific production compatible with a high quality graduation program?

There is no doubt that the institutions visited will be highly accepted by the international scientific community and that they can pay a deciding contribution to the scientific and economic development of Brazil. Their production is fully compatible with a high quality graduation program.

Is there enough evidence that a significant number of faculty members does have a role of leadership and representativeness in their own national and international community?

There is enough evidence in all institutions visited that a significant number of faculty members does have a role of leadership and representativeness in their own and international community.

Is the technological and scientific production of the faculty relevant according to international standards? Does this production have an adequate distribution among community?

Looking into the technological and scientific production performed, it must be confirmed that the visited institutions can compete with highly ranked faculties abroad. Of course some of the faculties are stronger in more fundamental research and others in application oriented scientific research, but these activities are of equal quality and importance to the general purpose of creating a favourable learning environment.

Distribution within research areas of the same faculty seems sometimes uneven, but this is true of any faculty at any university in the world; moreover, it would be inappropriate to measure the contribution given by each individual faculty member without taking into account efforts put in the general interest of the programs (teaching, fund raising, administrative work, etc.)

How do the assessed program compare with similar international high quality programs regarding to its scientific and technological production?

The quality of the assessed program can without restriction be compared with similar international high quality programs regarding to its scientific and technological production.

UFRJ – Federal University of Rio de Janeiro

Learning Environment: research areas: General remarks

Two thirds of the faculty and staff are dedicated to the thermal science, solid mechanics and acoustic and vibration research facilities. All professors are keeping international scientific contacts and also contacts with industry. Their postgraduate students are involved in such programs. About 80 % of necessary research activities are funded by co-operation programs with industry. The relevant publications in internationally well known journals show a very high standard.

Learning environment: faculty

All faculty have a PhD or equivalent:; 8 over the 26 permanent plus adjunct professors obtained their degree at COPPE/UFRJ, the others at prestigious universities in Europe and USA. The earliest UFRJ degree was awarded in 1975, the latest ion 1996, compared to the earliest and the latest awarded abroad respectively in 1969 and 1995.

Learning environment: laboratories and equipment

The laboratories for Mechanical Design & Robotics and for Manufacturing should not yet be taken into consideration because it is just now under development. Several numerically controlled machines will be networked within a flexible manufacturing system. Especially for application oriented research, this future labs will be of high importance.

The labs mentioned above were in excellent condition and the research topics and the competence of people involved were very good. They are doing an excellent work in developing a lot of their research equipment themselves. For example, nearly the whole experimental devices in the fluid dynamics lab had been realized by Prof. Átila P. Silva and his group including his Master and Ph.D. students. Within 5 years he succeeded in developing a national center of excellence in this field. Furthermore the labs of UFRJ are giving a good example how to integrate very efficiently research and teaching facilities and offices of professors and staff.

Learning outcomes: quality of the thesis projects

A sample of theses was examined, for each of them it is indicated the number of paper in International Journals and in Conferences (national or international) that has been originated by the thesis project; in all cases the published papers bear the name of the student, and can be retrieved as such in list of Departmental Publications.

Pontificia Universidade Católica do Rio de Janeiro PUC-Rio

Learning Environment: research areas

At PUC the committee analyzed the following main research areas: Thermal Sciences, Solid Mechanics and Computer Graphics and Automation.

The faculty had to suffer a far reaching cut of federal support from 80 % to a total suspension in 1995. Only 19 professors and 11 members of the administrative and technical staff are now responsible for high quality research and education in a diversified area.

Because of the high motivation and engagement of all people involved, the teaching overload they have undertaken and the successful cooperation with industry they could realize the lowest cost per student in the country, without decreasing the high standard of teaching and research. Undergraduate students are widely integrated into the research activities.

In the meeting with the postgraduate students a very high motivation has emerged. They did not claim any bottlenecks concerning their contacts with their supervisors or concerning the availability of equipment and library needs. They mainly decided to do their studies at PUC because of the well known high standard and the more theoretically oriented studies.

Learning environment: laboratories and equipment

The research activities going on in the labs mentioned above are of high standard and actuality. They are documented both in international journals and, with some preference, in international conferences. Intensive international contacts are cultivated. Services are offered to outside institutions and industries in many fields and especially in the area of metrology and calibration.

Learning outcomes: quality of the thesis projects

It was not possible, due also to limited available time but also to difficulties in data retrieval on the part of the institution, to gather evidence about the connection between project reports and papers published in International or Indexed Journals.

Further considerations

The Director of the Programme objected to the fact that the Commission was not giving emphasis to paper presented at International Conferences. The Commission explained that papers in international journals do normally imply amount of paper presented at cnferences of various kinds, which are a faster means of publication.

Moreover, the Director pointed out the opportunity to take into account the exchange of visiting professors; the Commission suggested that a document could be received when drafting the final report in Brasilia.

State University of Campinas (Unicamp)

General remarks

In all the areas visited the research and teaching environment looked excellent. Outstanding is also the engagement of the faculty in qualifying the teaching staff of other universities within institutional academic agreements. Furthermore they cultivate informal cooperation with other universities with the objective to qualify teaching and research staff (31 Ph.D. Degrees in 7 other universities).

A new version of the masters degree, the “Industrial Master”, had been created in the fields of instrumentation and control, refrigeration and air conditioning, total quality and manufacture management and planning. The duration is between 12 and 24 months. This new program fulfills actual market demands and will strongly support the industrial development within these areas.

Again there had been a very open discussion with M.Sc. and Ph.D. Students. Like at the other campuses visited the high motivation was obvious. Again the attractiveness of the facilities and faculty qualifications turned out to be deciding for the students when choosing the place to study. No real bottleneck or weak points could be mentioned by the students.

The faculty could reach the shortest duration of the graduation times in the country. The selection of students to be admitted is very strong. Doctorate students are selected by interviews and analysis of their CV.

Learning environment: faculty & staff

All faculty have a PhD or equivalent:; 24 over the 52 obtained their degree at prestigious universities in Europe and USA, the rest in Brasil. It is a policy of the institution that if the doctoral degree is awarded in Brazil, the member of staff must have a post/doctorate abroad; the director of studies has declared that about 50% of this section of faculty has already fulfilled this obligation.

Learning outcomes: quality of the thesis projects

A very limited sample of theses was examined, for each of them it is indicated the number of paper in International Journals and in Conferences (national or international) that has been originated by the thesis project. However, the director of studies has declared that the cases observed represent a normal situation, by which all doctorate projects originate a number of publications in international journals and in conferences.

Federal University of Santa Catarina (UFSC)

General remarks

In all areas research is standing in the front line of international activities. The qualifications of the faculty are excellent, mainly because of the participation in many international programs. Without doubt the faculty of mechanical engineering of UFSC can compete with the highest ranking faculties in industrialized countries.

The majority of the faculty members attained their doctoral degree at high ranking universities in Europe and the United States and many from highly ranked universities of Brazil.

About 200 undergraduate students are integrated into research activities. Many of them are designing and producing experimental devices to be used in teaching courses. This early integration into research projects highly motivates the students. They are also attracted by the international links the faculty keeps.

Another outstanding activity is the high degree of innovation processes. Many faculty members are not only creating new ideas but are also transferring these ideas into real modern products which are unique worldwide. As an example, the manufacturing of highly sophisticated computer controlled welding controls and generators should be mentioned. There is a remarkable amount of money flowing back into the research and teaching facility, thus enabling the investment of more human and material resources. For students this approach offers training facilities close to a real industrial environment.

Finally important services for the industry are offered in the field of metrology and calibration, noise control and acoustics as well as in other areas.

Learning environment: faculty & staff

All faculty have a PhD or equivalent:; 18 over the 34 permanent plus adjunct professors obtained their degree at Brazilian Institutions, the others at prestigious universities in Europe and USA. The earliest Brazilian degree was awarded in 1976 , the latest in 1998, compared to the earliest and the latest awarded abroad respectively in 1974 and 1996.

Learning environment: laboratories and equipment

In UFSC the evaluating group visited the following laboratories:

- Laboratory of materials
- Lab of metrology and automation
- Solar energy Lab
- Lab of welding and mechatronics

- Lab of vibration and acoustic
- Center of Refrigeration, Ventilation and Air Conditioning research
- Lab of numerical simulation in fluid mechanics and heat transfer
- Lab of machine tools and numerical control

The high reputation of the research and teaching staff again motivates international funding agencies to support the faculty. As was shown in the labs many of the modern apparatus are gifts from foundations and industries abroad thus supplementing the limited national funds.

Important

The area of materials is since 1994/1995 an independent Graduate Program (Master and Doctorate). Then, only a small number of students are under way. In consequence, the majority of the faculty are not engaged with new doctorate formation, in the Mechanical Program.

Resumos traduzidos dos relatórios originais, organizado por grupo de consultores

1º grupo: Profs. W. Hoffmann e J. Fouke

Eng. Elétrica – UFPB-CG:

A formação do corpo docente é competitiva com padrões internacionais. Contudo, há deficiências: 3 dos 4 últimos contratados são doutorados na UFPB-CG, essa endogamia pode levar à estagnação. A dedicação ao ensino parece apropriada, conquanto novas ferramentas e técnicas de ensino não parecem ser empregadas. A escolha das áreas de pesquisa é influenciada pelas publicações internacionais disponíveis e nenhum projeto é de ponta; há 0.5 artigos docente/ano, taxa competitiva em termos nacionais, mas não internacionalmente. Isso se deve à fraca infraestrutura, que impede alguns projetos de pesquisa. Os docentes atuam na graduação e na pós, e seu trabalho é mais local que internacional. O assuntos das teses são relevantes sob ótica científica, mas sua conexão prática com o desenvolvimento do Brasil não é clara. Os projetos de alunos são influenciados pelos do orientador e os financiados pela indústria são muito raros, e não estão voltados à ciência. Alguns projetos de doutorado buscam elaborar equipamentos que não se pode comprar por falta de dinheiro, e outros se voltam a treinamento de terceiros, o que não é de forma alguma pesquisa científica. A falta de cooperação industrial, em parte por causa da ausência de indústrias próximas, deveria ser vencida de alguma forma, uma vez que provê emprego aos egressos. Se a maior parte destes vai para a academia, questiona-se se o mercado está sendo atendido. Considerada a falta de recursos e instalações, o trabalho teórico é bom, mas não há evidência de prêmios ou convites para palestras em eventos, ou seja, falta reconhecimento internacional, o que é causado pela não-articulação da teoria com a prática. Por tudo isso, não há muitas chances de se formar avançados pesquisadores e não se pode apreciar bem a qualidade dos alunos novos. O programa é atraente apenas para brasileiros ou pessoas de países vizinhos, com admissão de 60% dos candidatos e alta desistência; no entanto, a interação entre a graduação a pós, a pesquisa e o ensino é muito boa. O intercâmbio de pesquisadores e seu resultado é pouco evidente. A pesquisa, em relação à qualificação de doutor, não pode ser considerada profissional; há pouco rigor na preparação de estudantes e muita improvisação. Os laboratórios são precários, muito poucos são de padrão internacional e mesmo aí são subutilizados; há pouca preocupação com segurança, e o acesso à Internet é demasiado lento. A biblioteca possui poucos jornais (séries incompletas e nada após 1997) e livros. Os computadores não são novos e não estão associados aos experimentos. Há falta geral de recursos, especialmente para equipamentos. Sugere-se: apoio financeiro para equipamentos e treinamento prático-industrial para estudantes. Apreciação:

embora haja bom embasamento teórico, falta o importante aspecto prático; a pesquisa carece de relevância para a engenharia; sem um embasamento tecnológico, não há senso de produção científica não-competitiva; muito pouco é comparável com programas internacionais de qualidade.

Eng. Elétrica – Puc-Rio:

Os curricula docentes apontam nível respeitável e muitas experiências internacionais. Não parece haver muita interação com a indústria. Os grupos de Comunicações e Teoria de Controle são particularmente fortes, embora os de Microondas e Optoeletrônica careçam de membros e investimentos. O ensino (também na graduação) tem utilizado novas tecnologias. A pesquisa é prioritária e os projetos de longa duração. A elaboração de artigos é prioridade zero; a taxa por docente poderia ser maior. A orientação é distribuída por todos os docentes. A qualidade das teses nos grupos principais merece destaque internacional e, nos outros grupos, destaque local. Os projetos costumam ser de importância prática, uma vez que muitos são financiados por indústrias (bolsas, equipamentos) ou agências estatais; os de Sistemas de Distribuição são vitais para o país. As condições de formação de pesquisadores são as melhores para o comitê; são exemplos os laboratórios 24h, os computadores e a cooperação com outros grupos. O programa é altamente atrativo, mesmo não havendo no mercado trabalho para todos os egressos. O alto nível teórico não está contudo relacionado com as questões emergentes, isso pode inibir em parte o intercâmbio de pesquisadores. O câmbio atual desfavorece o convite aos estrangeiros e às importações. A qualidade dos laboratórios experimentais é de padrão internacional, e a biblioteca está em excelente estado, com os periódicos mais recentes, apesar de seu alto custo. Há ampla oportunidade de intercâmbio internacional, e a Optoeletrônica tem recebido alunos e pesquisadores estrangeiros. O aporte de recursos decresceu nos últimos anos, o que se reflete nos laboratórios e mesmo na escolha das áreas e impede também novos investimentos. Apreciação: as teses, conquanto heterogêneas, são em muitos pontos de alto padrão; poucos docentes têm liderança nacional e só um, internacional; o aspecto teórico é competitivo internacionalmente, mas o tecnológico não é tão uniforme; o programa é comparável àqueles internacionais de alta qualidade.

Eng. Biomédica – UFRJ

Docentes titulados em universidades competitivas, parte no exterior; não parece haver pessoal com graduação em Medicina ou Biologia, com quem deve haver contudo forte cooperação. Dedicação adequada ao ensino; uso de alta tecnologia de ensino, e a relação teoria-prática é perfeita, embora talvez uma melhor divisão de tempo fosse recomendável. Os alunos ressaltam a qualidade dos docentes e dos seminários e apreciam a dinâmica da orientação. O ambiente de pesquisa é muito bom para todos os grupos. Só se registra um docente visitante em três anos, mas os estudantes relatam sempre encontrar estrangeiros. Os alunos parecem receber bastante apoio material, o que é muito útil no primeiro semestre, considerando a variável origem dos mesmos. Muitos projetos são relevantes à nação, e muitos vêm de contatos com a indústria (de caráter local), o que significa recursos; contudo, poucos projetos são de pesquisa básica, o que é crítico para bons programas. Dado o número de resumos em anais, poder-se-ia publicar mais em bons jornais, favorecendo o reconhecimento externo. Muito do trabalho vem de dados hospitalares e é um incentivo à transdisciplinaridade. O equipamento poderia ser melhorado em alguns casos para atingir padrão internacional; observa-se a improvisação não prejudicial aos alunos, podendo mesmo imbuí-los de capacidade inovativa. O programa é atrativo e seletivo (25%), o "nivelamento" toma muitos meses, e o abandono é baixo. É positiva a exposição dos hospitais à engenharia clínica, e esse treinamento poderia ser exportado à África/Ásia. Dos egressos, 80% vão à academia; alguns atrasam a titulação para assumirem empregos. O ambiente é atrativo a pesquisadores externos e àqueles que buscam especialização. O departamento já é respeitável, e isso melhoraria com maior colaboração com institutos biológicos e hospitais. O programa poderia fazer o altamente necessário trabalho de estabelecer um padrão de eng. clínica, mesmo se este não

é o papel de um PPG. Embora os docentes se orgulhem do equipamento, há estudantes responsáveis por ele, e não parece haver nada incomum ou muito caro; ressalte-se que isso não afeta a investigação. Existem muitos livros e foi dito que não há restrições de periódicos, encontrados na biblioteca central. Os computadores são adequados. O suporte financeiro, embora adequado em termos nacionais, não é suficiente no momento para pessoal, equipamentos e outros investimentos. Sugestões: buscar auxílio sobre atividade em eng. clínica, ou cobrar o governo ou hospitais pelo serviço e aumentar a cooperação com docentes da medicina. Apreciação: alta qualidade de teses (2 prêmios); o trabalho é mais importante para a nação do que para a competição internacional; a pesquisa é competitiva mundialmente, mas não homogênea entre docentes e tecnologia adotada; o programa é competitivo como seus pares internacionais e atinge alto nível científico.

2º grupo: Profs. I. Grossmann e X. Joulia e R. Wellek

Eng. Química – Unicamp

Após a apresentação do programa, seguiu-se visita aos laboratórios e entrevista com docentes e alunos. Percebeu-se um maior interesse do programa em enfatizar o aumento do número de alunos e titulados, em detrimento da produção científica de alto nível. Da divisão em cinco subáreas, três não são claramente distintas, o que não ajuda a visibilidade do programa. Os laboratórios são bem equipados com modernos computadores. Para julgar a inserção internacional, analisou-se:

Corpo docente – todos doutores, atuando também na graduação; a orientação e produção se concentra em 20% dos docentes. Todos devem ensinar na graduação, mas talvez só uma parte deva atuar na orientação/pesquisa. Cerca de 40 artigos produzidos (nacionais e internacionais) em 1999, alguns nos melhores jornais, mas localizados nos docentes que participam mais do programa, tendência a publicar em anais. Muitos docentes possuem papel de liderança e representação, aí contando a atuação nacional da Unicamp na edição do *Braz. J.Chem.Eng*., e a organização de congressos nacionais na área. Há sucesso na obtenção de bolsas e recursos federais, estaduais e estrangeiros, e há importante atividade de transferência tecnológica e cooperação industrial;

Teses – taxa média alunos/docentes adequada mas há contudo dois docentes com 40 orientandos. Não há também requisitos de publicação antes da defesa, um mecanismo de controle de sua qualidade. O tempo de titulação pode ser reduzido pela integração mestrado-doutorado em alguns casos.

Qualidade geral – muito boa e adequada ao 6, e comparável a bom programa no exterior, podendo melhorar com o aumento de publicações nos principais veículos.

Recomendações gerais – muitos docentes são jovens e com potencial, mas se deve incrementar a pesquisa cooperativa, visando maior qualidade e visibilidade. Quanto à concentração da produção em poucos docentes, estes devem ser estimulados, bem como os demais, talvez por meio de trabalho de equipe entre sub-grupos. Deve haver um programa de apoio ao docente iniciante. Deve-se exigir pelo menos um artigo em jornal internacional por tese, visando sua qualidade.

Eng. Química – UFRJ

Apresentação geral, discussão com docentes e alunos, visita aos laboratórios e coleta extra de dados. Sendo o 1º programa do Brasil, fundado em 1963, já formou 500 mestres e 100

doutores. Todos os 17 docentes são pesquisadores ativos e participam da graduação, oferecida contudo por outro departamento. Houve queda no número de mestres titulados nos últimos anos, associada ao corte de bolsas federais. Uma parte das instalações físicas é boa, a outra, um porão, é inadequada, sendo uma surpresa que o programa funcione em tão adversas condições; há um novo laboratório (de uso também por outros programas) em construção. Não há queixas sobre bibliotecas. Apesar do supercomputador da UFRJ, observam-se os computadores pessoais antigos e lentos, em número insuficiente.

O corpo docente é excelente (e só um não é bolsista do CNPq), bem como a produção: 2.7 artigo docente/ano, em jornais de prestígio, o que é comparável aos 20 melhores programas dos EUA; a produção em anais é também muito forte e presente em importantes eventos internacionais. Boa parte dos docentes pertence e trabalha ativamente em importantes associações e comitês internacionais. A obtenção de bolsas e recursos federais é bem-sucedida, bem como prêmios nacionais de melhores teses e eleição de um docente para a Academia Nacional de Ciências. As interações com grandes indústrias são muito boas. O trabalho de equipe é entusiástico e se pauta por altos padrões.

O corpo discente, altamente motivado e articulado, impressiona com muitos com experiência no exterior. Foram atraídos ao programa pela sua reputação, apesar do alto custo de vida no Rio, e estão satisfeitos com a orientação. As fraquezas apontadas são os computadores e as dificuldades de obtenção de reagentes. Há que se ter um artigo aceito por jornal internacional antes da defesa da tese, o que é uma imposição de qualidade, bem como deve-se apresentar o trabalho em evento internacional, embora os alunos por vezes tenham que usar seus próprios recursos para tanto. Preferem manter as teses em português, conquanto em inglês a eventual confecção de artigos fosse mais fácil.

A qualidade do programa, dos docentes e dos trabalhos é muito forte e deve ser um dos programas de topo no Brasil, sendo recomendada uma nota 6 ou 7-. Só dois programas na Argentina (Santa Fé e Bahia Blanca) e o da UAMéxico lhe fazem face. O único aspecto negativo é a condição física inadequada de alguns laboratórios.

Recomendações*:* a distribuição etária docente é boa; contudo é um desafio futuro que jovens docentes atinjam o patamar de seus pares seniôres. Para que o programa mantenha sua posição no futuro, deve envolver outras áreas (Processos Biotecnológicos e Ambientais) e incrementar a cooperação com o setor industrial. Finalmente, a prioridade atual é a já citada má instalação, o que pode mesmo inibir a visita de docentes e estudantes estrangeiros ao programa.

Eng. Metalúrgica, de Minas e Materiais – UFRGS

Com 20 docentes em 13 laboratórios, 100 alunos de mestrado e 100 de doutorado, o programa já graduou 434 mestres e 62 doutores. As visitas e entrevistas foram bem organizadas, e os docentes responderam a um questionário sobre contribuições individuais, elaborado com vistas a comparações internacionais. As áreas técnicas do programa são importantes para o desenvolvimento do país. A principal questão levantada pelos docentes foi sobre como se encontra o programa, em comparação aos internacionais. A infra-estrutura de pesquisa foi considerada muito boa e de padrão internacional, graças ao bom suporte de agências como Finep e CNPq.

Corpo docente – a produção em veículos internacionais foi zero em 1996 e 11 em 1997, ou 0.5 por docente (adequado para o Brasil, mas baixo internacionalmente), que deveria ser aumentado em 1998-1999; em anais houve entretanto 140 resumos. Quatro docentes pertencem a quadro editorial de periódicos, número alto internacionalmente, que se soma à boa participação em sociedades internacionais. Um ponto forte é a interação com docentes no exterior, especialmente a Alemanha, melhorando a qualidade da pesquisa, o que já não ocorre com os bons convênios com a indústria. Não segue a tendência internacional de reduzir a pesquisa em

minas-metalurgia, o que pode contudo aumentar o convênio do programa com o setor no país. Há bom registro de contribuições à indústria e à sociedade, patentes (3 na França) e diversos processos originais. É muito boa a habilidade de trabalhar em conjunto, considerando a diferença de modernidade na pesquisa (soldas X plasma de superfície) e a preocupação com a qualidade.

O corpo discente é inteligente e ativo, e as queixas se atêm à dificuldade e à burocracia para compra de equipamentos; consideram a elaboração de artigos normal, mesmo se em inglês.

Qualidade geral – o programa é muito bom, considerado sob padrões internacionais, e a nota 6 é adequada, não merecendo no momento a nota 7. É necessário aumentar a publicação em veículos internacionais de qualidade.

3º grupo: Profs. P.G. Hoadley e D. Dinkler

Observações gerais:

Os principais pontos são: qualidade do corpo docente, teses e dissertações, pesquisa e publicações. O comitê não tinha informações prévias dos programas, que deveriam ser remetidas 2 semanas antes aos membros. A exigüidade do tempo (recomenda-se 6-8 h) restringia a visitas às instalações (onde então se discutia com os docentes) e a apreciação de currículos, teses e publicações.

Área de Geotecnia Programas e Subáreas

Usp-SC – com 10 anos, o programa possui excelentes docentes, contudo a maioria fez lá seu doutorado, recomendando-se o recrutamento externo. Por outro lado, dispõe de vários membros realizando pesquisa no exterior. Os laboratórios conduzem trabalhos em importantes áreas e a produção intelectual é excelente, bem como a biblioteca os campos experimentais. A comissão o colocou junto com os 10% melhores programas dos EUA.

UFRJ – a área de Geotecnia é uma das 3 maiores do imenso departamento de Eng. Civil, e a comissão só dispôs de 2:30h para visitá-lo de modo que foi impossível avaliá-lo adequadamente. O corpo docente parece muito bom; os laboratórios parecem velhos e um novo está em construção; teses e publicações parecem excelentes. Teria sido muito útil se a publicação da Coppe em inglês tivesse sido remetida antes ao comitê.

Puc-Rio – uma das duas maiores áreas do departamento. de Eng. Civil, a Geotecnia atua em duas importantes áreas de pesquisa. O corpo docente é muito bom e formado em ótimas universidades no exterior. A produção intelectual é excelente. Os laboratórios, embora pequenos (necessitam urgentemente de espaço), mas os equipamentos, muitos lá construídos, são excelentes. A comissão o coloca junto com os 10% melhores programas dos EUA.

UnB – com 9 docentes de tempo integral, treinados em excelentes universidades no exterior. A qualidade das teses e publicações parece excelente, assim como a pesquisa, de natureza analítica. Os espaço dos laboratórios parece subutilizado e o equipamento parece convencional, e poucos projetos de pesquisa parecem ativos. A comissão o compara com os 40% melhores programas dos EUA.

Conclusões: em geral a comissão ficou bem impressionado com os programas e estimaria mais tempo para avaliá-los. O conhecimento prévio dos materiais impressos resultaria em visitas mais produtivas e eficientes.

Eng. Civil e de Estruturas

Os programas visitados oferecem ensino e pesquisa de alto nível, cada um com sua especialidade, o que dificulta as comparações. Os tempos de titulação estão adequados. O esquema dos mestrados e qualidade das dissertações é compatível com padrões internacionais, mas talvez fosse útil discutir reduzi-los a uma pesquisa de um ano; no futuro pode ser mais importante adaptar-se a novas áreas do que especializar-se profundamente em uma. Os temas das teses de D.S. são atuais e de interesse geral, em parte afeitos a problemas locais; uma curta revisão apontou modelos mecânicos e algoritmos de nível internacional. A veiculação internacional, mormente em jornais de alto padrão, está crescendo, mas não para todos os docentes e subáreas. Os corpos docentes não são homogêneos, há aqueles em que todos os membros foram pós-graduados no próprio programa, e outros que selecionam candidatos vindos do exterior. Poucos vão continuamente ao exterior para pesquisa ou pós-doutorado, o que é comum nos EUA ou UE e importante porque permite pesquisas conjuntas, câmbio de estudantes e, o que se deve buscar, o desenvolvimento de liderança internacional em algumas áreas.

Usp-SC – Eng de Estruturas – O programa, bem estabelecido, abrange quase todas as subáreas de Estruturas. A produção é em parte veiculada em jornais de 1ª linha. Poucos docentes parecem capazes de liderança nacional e representatividade no exterior, a endogamia é quase total e poucos fizeram pós-doutorado no exterior. Não há também possibilidades a novos e promissores pesquisadores. Há algum contato com grupos de pesquisa no exterior. A interação com a indústria e o número de projetos de pesquisa poderiam ser aumentados.

UFRJ – Eng. Civil – embora bem desenvolvido, suas três principais áreas de atuação têm qualidade e importância diferentes. O grupo de mecânica computacional é de padrão internacional. Convênios com a indústria mantêm projetos e geram importantes recursos. Algumas pesquisas são projetos interdisciplinares de importância para o futuro. Os docentes devem buscar mais experiências e pós-doutorados no exterior. Alguns possuem liderança nacional e internacional em suas áreas.

Puc-Rio – todo o corpo docente é doutorado nos EUA ou UE, o que é a causa do rico intercâmbio científico. A produção, em parte em tópicos sofisticados, é de nível internacional, contudo é feita a poucos docentes, o que pode melhorar no futuro; alguns podem vir a ter liderança nacional e internacional em suas áreas. Os projetos são financiados por diferentes convênios industriais ou agências estatais.

Observações finais – são todos excelentes programas de pós-graduação e com alto nível científico no campo teórico; o trabalho desenvolvido é de nível internacional e pode ser incrementado por convênios industriais e com agências de fomento. A criação de novos campos de pesquisa e idéias inovadoras deve ser feita também no Brasil, o que é um desafio para todos os docentes. O desenvolvimento destes pode ser um problema, dado o não-preenchimento de vagas de aposentados; outro ponto é a posição permanente de alguns docentes, uma contínua flutuação deve ocorrer, como por exemplo por pós-doutorados, visando arejamento de idéias e conceitos educacionais.

4º grupo: Profs. N.C. Beaulieu e K.F. Knoche

Observações gerais sobre os programas de Eng. Elétrica (Unicamp, Usp e UFSC) e Mecânica (Usp)

Os objetivos da avaliação foram: comparar os programas com aqueles de alto nível dos EUA e da UE; verificar a adequação dos laboratórios; revisar a nota da CAPES para cada um; avaliar o ambiente de pesquisa e ensino e determinar pontos fortes e fracos. As visitas foram bem organizadas pela CAPES e o tempo, embora exíguo, estava estruturado de acordo com nível de

informação requerido. Os programas da UFSC e Unicamp forneceram valiosos dados adicionais, enquanto o da USP tentou mostrar muitos laboratórios em pouco tempo; em todos houve pouco tempo para discussões entre membros do grupo, o que foi muito mais difícil em São Paulo, onde os consultores ficaram em hotéis diferentes. A avaliação é embasada nas estatísticas da CAPES, dados adicionais dos programas, exemplos de provas finais (só para Eng. Elétrica, nas especialidades do comitê), impressão sobre os laboratórios e discussões com docentes e alunos.

Aspectos positivos em comum

Todos os docentes são doutores; apoio de agências como a CAPES e CNPq; excelentes laboratórios e bibliotecas; forte cooperação entre docentes de todas as áreas de pesquisa e mesmo cooperação interdisciplinar, como com a Eng. Biomédica; presença do doutorado-sanduíche; publicações em jornais internacionais de primeira linha; membros externos nas bancas de defesa de tese; satisfação dos alunos com orientadores e o programa; as estudantes são tratadas com plena equidade em relação ao tradicionalmente predominante sexo masculino; estudantes incentivados para as sociedades profissionais; presença de alunos estrangeiros; a estrutura das bolsas da CAPES resulta em monitoramento próximo e benéfico do progresso estudantil.

Diferenças e oportunidades observadas

O apoio da Fapesp é altamente significativo, o que deixa a UFSC em desvantagem.

Pontos fracos

Embora todos possuam publicações em periódicos internacionais de ponta, seu número em relação ao de docentes é muito inferior ao dos melhores programas nos EUA e UE. Uma vez que a qualidade dos artigos acompanha o padrão internacional, isso deve ser causado pela excessiva carga de ensino em relação à pesquisa, e não se identificou nenhuma maneira de diminuir o problema, mesmo se os alunos da pós assumirem parte da atividade de ensino. Em relação às outras IES, a cooperação entre a Unicamp e a indústria é menor, sem justificativa válida. Do ponto de vista americano, a falta de bolsas de sociedades internacionais (IEEE, ASME-IEEE) pode ser encarada como ausência de reconhecimento internacional; a Unicamp possui duas, o que é pouco em relação ao corpo docente. A UFSC não as possui e nem tem membros na Academia Nacional de Ciências, embora possua bom número de membros sêniores na IEEE, bem como um editor associado do principal *journal* da área. A Usp também só possui duas bolsas IEEE, o que é igualmente pouco.

As notas

Todos os docentes queriam discutir a nota 7, observando que seus programas eram relativamente melhores que muitos das Ciências Humanas com essa nota, com o que os consultores concordam. Se a nota 7 se refere aos melhores programas internacionais, a nota 6 é adequada, por causa dos pontos assinalados acima. Mas se o 7 se aplica a programas internacionais de alta qualidade, o comitê recomenda a nota 7 a todos, ressaltando a performance acadêmica da Unicamp e a cooperação industrial da UFSC. Finalmente, observa-se com satisfação a excelência crescente observada nos últimos anos.

Eng. Materiais – UFSC:

O programa destacou-se na qualidade das informações apresentadas ao grupo previamente à visita (dois dos artigos publicados referiam-se a trabalhos de docentes realizados em IES no exterior). A apresentação do programa, bem conduzida, propiciou interessante discussão com o corpo docente, e em menor escala com o discente. Seguiu-se visita de uma hora aos laboratórios, muito bem equipados e sofisticados, de acordo com padrões internacionais; no entanto observou-se uma certa dificuldade de manutenção dos aparelhos, em razão da distância dos centros de serviço. Entende-se a posição destacada da Ufscar, mesmo como consequência do apoio da Fapesp. Apesar da forte relação com a Alcoa, não há muitas outras interações com industriais. Como impressão geral, o que ocorre na Ufscar é extremamente positivo, não restando dúvida da adequação do conceito 6. Contudo, se a nota 7 se refere à comparação com os melhores programas do mundo (MIT ou Max Planck), esta não é apropriada, mas há que se lembrar que esse requerimento é muito restritivo. Mas se usados como base de comparação os bons programas nos EUA ou Europa, a nota 7 é adequada. Há ainda uma incerteza quanto à definição sobre a nota 7, o que causou hesitação quanto a uma recomendação final.

Eng. Metalúrgica e de Materiais – UFMG:

Ao chegar ao departamento, foram entregues as informações sobre o programa. Na reunião de apresentação, foi ressaltada a influência da indústria de aço de MG nas atividades de metalurgia do programa. Convém apontar que essa área de pesquisa praticamente desapareceu nos EUA e na Alemanha, mas ainda é ativa no Canadá, África do Sul e Austrália. Assim, os consultores não se julgam competentes para julgá-la, mas notam o surgimento de novas áreas, como ciência de polímeros e cerâmicas. Houve depois vívida discussão com os estudantes, notando-se preocupação unânime com o grande número de créditos e a falta de flexibilidade (na UFSCar a situação parece similar, apesar do menor tempo passado com os alunos). Procedeu-se depois as visitas aos laboratórios (usados por alunos da graduação e da pós), considerados novos e de alta qualidade, embora se tenha relatado que nos últimos anos o apoio financeiro tenha decrescido. Ou seja, há o risco de que a qualidade atual seja difícil de manter, e sempre há o problema da falta de manutenção. Esta foi a principal preocupação da UFMG, enquanto na UFSCar foi a falta de recursos para a biblioteca. Na UFMG, essa era a 2ª preocupação, mas também muito importante. Acabou-se concluindo que este problema tende a ser tornar insolúvel e perigoso, já que a competitividade internacional depende do acesso a informação. O aspecto geral é muito positivo, sem dúvidas, quanto à nota 6, e de novo a indefinição sobre a nota 7 se fez sentir. Há uma ligeira tendência em considerar o programa da UFSCar superior, o que se deve considerar com cautela, pois o exíguo tempo de visita dificulta distinções acuradas.

Eng. Metalúrgica e Materiais – UFRJ:

O prof. Kaesche, que passou algumas semanas na Coppe em 1985, aponta a forte evolução do curso. O esquema da visita foi similar aos anteriores. Depreendeu-se que os convênios com o setor industrial, mormente pela Coppetech, são significativos (fração considerável das atividades da Coppe) e superiores aos verificados na UFSCar e na UFMG, permitem vantagens consideráveis à Coppe e são resultado de sua, há tempos destacada, posição na engenharia brasileira. Tomou-se conhecimento dos "Núcleos de Excelência", idéia considerada desejável, e de que os créditos não são considerados excessivos ou rígidos, como nos outros dois programas. Há grande espaço físico para expansão dos laboratórios, cujo equipamento é excelente. Aparelhos mais velhos ainda em uso poderiam ser aposentados e mantidos como história do

programa, mas muitos ainda funcionam bem. É contudo importante ressaltar a alta qualidade do material mais moderno, em particular os laboratórios de filmes finos e superfícies, sempre ocupados com pesquisa, o que parece ser um bom exemplo de "Centro de Excelência. Como nos outros programas, a nota 6 é inquestionável, com tendência a 7, dependendo do conceito exato da nota 7.

Comentários finais

Os três programas são de excelente qualidade, embora todos se preocupem com a falta de recursos para a biblioteca, e o Brasil deve se congratular por oferecê-los.

P.S. O consultor M.L. Rudee ressalta e sugere para o Brasil o Mestrado Profissional em Engenharia, segundo o modelo americano. Além disso, ressalta que os tempos de titulação são altos, o que deve ser considerado pela CAPES e outras agências. É interessante observar que, enquanto o corpo docente é em média mais jovem do que nos EUA ou UE, o corpo discente é mais velho.

6º grupo: Profs. S. Carmi, M. Gola e W. Massberg

Observações gerais sobre os programas de Eng. Mecânica

Todos os programas possuem equipamentos comparáveis com os dos laboratórios de pesquisa no exterior, e onde não há recursos suficientes os próprios programas produzem seus aparelhos em suas oficinas, quando possível. Também fazem uso de instalações de outros departamentos, se necessário. Na UFRJ e UFSC as salas de professores e técnicos (e mesmo salas de aula) estão dentro dos laboratórios, aumentando o contato com os estudantes e da teoria com a prática, o que é didaticamente interessante e aumenta o interesse de estudantes de graduação. Em todos, os laboratórios são bem mantidos e os estudantes motivados e competentes, que dizem não ter problemas de acesso a orientador e computadores; o mais comum é a demora para conserto de aparelhos. Observou-se, pelas discussões e referências nas publicações, que o "estado da arte" internacional na área é bem conhecido e utilizado. Todos oferecem serviços ao setor industrial, donde se obtém recursos adicionais. A UFSC possui bons convênios com a indústria, em razão da aparelhagem conseguida com recursos estrangeiros. Todos mantêm contatos com reputadas instituições no Brasil e no exterior. Os resultados são vistos não só na produção bibliográfica, mas também nas cooperações técnicas, levando a novos processos e mesmo produtos, o que deve ser considerado pela avaliação da CAPES. Quando perguntados por que se decidiram por sua universidade e não outra, os alunos apontaram a reputação dos docentes, a variedade de áreas de estudos, infra-estrutura laboratorial e contatos internacionais. A seleção é efetiva, uma vez que somente 15-20% dos candidatos a aluno são aceitos. Todos os programas evidenciam docentes com representatividade e liderança em sua comunidade e mesmo na internacional. Todos os programas, por sua produção, são comparáveis a bons programas internacionais. Aspectos específicos:

UFRJ: Excelentes laboratórios, onde se desenvolvem alguns dos aparelhos para pesquisa própria, como na área de mecânica de fluidos, que em cinco anos se tornou referência nacional. Boa integração de instalações de pesquisa e ensino; bons contatos científicos internacionais e com a indústria, que custeiam cerca de 80% das atividades.

PUC-Rio: Sofreu corte total dos seus recursos federais em 1995, e apenas 19 professores e 11 técnicos respondem pela qualidade do programa, mas graças à grande dedicação de todos e ao apoio da indústria, o programa tem o menor custo por estudante, sem perda da qualidade. Os estudantes, muito motivados, não sentem problemas de acesso à orientação e à bibliografia.

Atividades de pesquisa de alto padrão e publicadas em revistas reputadas, intenso intercâmbio com o exterior, convênios com o setor produtivo, principalmente na área de metrologia e calibração.

Unicamp: Laboratórios e equipamentos muito bons. Relevante esforço na qualificação de docentes de outras IES, por cooperação institucional ou informal. Criou-se o novo "Mestrado Industrial", nas áreas de instrumentação e controle, refrigeração, qualidade total do planejamento, visando atender o crescente mercado. Os estudantes não mencionaram pontos fracos do programa. Apresentar o mens tempo médio de titulação, e a seleção de alunos é severa.

UFSC: A pesquisa está na linha de frente das atividades internacionais. Excelente qualificação docente, o que motiva agências internacionais de fomento e empresas, conforme comprovam os muitos equipamentos, e faz o corpo docente do programa competir com o dos melhores cursos dos países industrializados, onde a maioria dos professores fez seu doutorado. Cerca de 200 alunos de graduação participam da pesquisa, principalmente da produção de aparelhos experimentais, o que os motiva e atrai ao programa, ao lado dos convênios internacionais. Outro ponto excelente são os processos de inovação, não só em idéias, mas em produtos únicos no mundo, como controle computadorizado de geradores. Há muita verba fluindo entre pesquisa e ensino, facilitando o investimento em recursos humanos e materiais e o contato dos estudantes com o ambiente industrial.

Recomendações gerais:

Em razão do curto tempo em cada programa e para facilitar a avaliação, sugere-se a elaboração de um instrumento de auto-avaliação, que seria enviado aos consultores com um mês de antecedência e que incluiria: lista de teses de doutorado e publicações derivadas por ano; publicações com co-autoria de mestrandos e graduandos; total de recursos de pesquisa para IES e programa; informações sobre atividades de egressos e planejamento estratégico de cada programa.

Avaliação Internacional da Pós-graduação

Física

Na última semana de março de 2000, a CAPES submeteu à Avaliação Internacional os programas de pós-graduação da área de Física, que receberam o conceito 6 ou 7 na Avaliação de 1998. Os documentos originais elaborados pelos examinadores estrangeiros, bem como seu resumo traduzido, são publicados abaixo.

1º grupo

Consultores

John S. Gallagher III, Universidade de Madison, EUA
Daniel Paget, Laboratório de Física da Matéria Condensada, França

Physics, Federal University of Rio Grande do Sul

Overall assessment

The program meets the international standards.

Preliminary

The Institute of Physics of the Federal University of Rio Grande do Sul (Porto Alegre) has 60 faculty members, which are active in the graduate program 66 Ph.D. students and 39 M.Sc. students. The dominant activities are experimental physics, theoretical physics and astronomy. Theoretical physics (29 faculty members, 24 Ph.D. students and 12 M.Sc. students) and experimental physics (23 faculty members, 30 Ph.D. students and 17 M.Sc. students) have an approximately equal weight, whereas Astronomy has a smaller surface (7 faculty members, 10 Ph.D. students and 7 M.Sc. students).

This year, the Institute has a severe funding problem since the previous fundings from Finep and PadcT (1MR$/ year until last year) are no longer available. Three groups (Ion Implantation, Superconductivity, and Astronomy) have already been accepted into Pronex, and two more groups (high pressure physics and theory) should be accepted soon. The current funding given by Pronex amounts to 20% of the funding of the previous years. As a result, a lot of time seems to be spent for looking for different sources of fundings of small amplitude, both for equipment and for travel expenses..

Organization of the visit

The visit was well organized and well prepared, although a full day did not allow us to visit all the research groups.

In a first stage we had a meeting with the director of the Institute and most of the faculty members, during which all the important general information was given to us, and where we could start an open discussion. Then, we visited the library and a few laboratories. Finally we had a fairly extensive discussion with a group of about 30 students.

Evaluation of the quality of the graduation program

Our overall impression is that this quality is very good, and completely comparable to international standards, but that the program needs additional fundings. The students have the opportunity to use advanced equipment, and some of the students who are involved into experimental research seem to have built major parts of experiments locally. Astronomy students gain observational experience in Brazil and more rarely at foreign observatories.

The material support is also very good : they have access to a well equipped library, although some cuts will have to be made in a near future because of lack of funding. Also, new well equipped computer labs have been recently installed in Physics.

The average duration of a Ph.D. is of 53 months which is close to the desired duration of 48 months, and of 25 months for M.Sc. (since the grants for M.Sc. are given for 2 years, that results in a strong pressure on the students during their M.Sc. work) There seems to be a very strong selection during the course of the studies : only 15% of the undergraduate students are able to graduate. The students told us that, this year, 30 of them wanted to start a M.Sc. after their graduation but that only 11 of them were allowed to do so. One strong point is that all students have tutorial activities which are independent from their main research subjects. Some M.Sc. courses are performed in very small groups, and the qualifying examination requires a bibliographical work.

During the discussion, the students asked for more courses and complained that they did not really know what were the selection criteria, since these criteria seemed to be changing from one year to the other, and were never clearly announced. Another problem is that, because of funding problems, the students have limited access to international conferences and to international or national research facilities.

Representation of faculty members in the national and international community

Examination of the resumes shows that nearly all the faculty members have performed research stays in foreign laboratories. The number of papers is large and a large fraction of them are published in top international journals. Several faculty members have been invited to international conferences and have contributed chapters in textbooks, and to serve as referees on major international allocation panels (e.g., in Astronomy).

Technological and scientific production of the faculty

On the average, the level of the research is surely comparable to the one performed in research institutes of other countries, with impressive results in many topics. The Institute has reached a critical mass in material science, where most of the current up to date topics (thin films, magnetic thin films, ceramics, sol-gel processes, high Tc superconductors, surface treatment by ion beams, high pressure physics) are addressed and where both synthesis and characterization are satisfactorily represented. From the list of publications, the level of the theoretical group is also very impressive.

The Astronomy Department is a small unit within the Institute. With 9 faculties the Department falls in the class of small graduate programs. It has therefore wisely chosen to focus its efforts in specific aspects of extragalactic astronomy, galactic studies, and stellar structure and evolution. Within their chosen areas most of the research is fully up to modern international standards, and is often carried out with international collaborators. For the future, the Astronomy Faculty are taking advantage of new observational capabilities in infrared techniques, and in extending their tradition of working with large archival databases; archives have the advantage of being freely available to the international scientific community, allowing the UFRGS astronomers to carry out on modern data sets without the need for students to travel. Through careful choices of collaborations, many of which are international, and the use of LNA telescopes, the Astronomy Department is very productive, with about 3 major refereed publications per faculty, the majority of which are in the top refereed journals. This equals the average output of equivalent size (but usually more highly funded) astronomy programs in North America or Europe. The Astronomy Department has trained people who are now becoming

leaders in their research fields; it is fully competitive with equivalent programs elsewhere in the world.

A significant fraction of the research in both Physics and Astronomy is performed in collaboration with national and foreign Institutes. For the astronomers, such collaborations are essential ingredients in gaining access to advanced research facilities, such as the large telescopes in Chile or observatories in space.

Among the outstanding facilities, we saw several ion accelerators. The very original and up to date aspects of this research concern metals, polymers, and also material characterization, (RBS, PIXE and ERDA) and we hope that this will be amplified in the future, with respect to ion implantation in semiconductors.

The various other experiments that we saw were equipped with modern equipment, and we were impressed by the technological capabilities of some groups who built their own equipment. Our impression was that the labs were very busy, with many students involved in the experiments. The Astronomy Department relies on computers. Its internal network of workstations and microcomputers is adequate, but external internet connections are not up to modern standards.

The Astronomy program also lacks any substantial instrumental enterprise. This is not surprising given the size of the group, but it is an area to consider where expansion to become possible in the future.

The interactions between the various professors seem satisfactory, although a closer collaboration between experimentalists and theoreticians, especially in magnetism, may appear desirable.

Several faculty members are strongly concerned about developing a collaboration with the industry, which is indeed desirable in view of the research themes. Although the amount of existing collaborations is still insufficient, some success has been reached, mostly in optics.

Department of Astronomy, University of São Paulo

Overall Assessment

The reviewed program meets international standards.

Preliminary

The Department of Astronomy by international standards is a medium size program, with 24 permanent faculty, about 50 graduate students. It is currently located at the site of the old observatory in São Paulo, far from the campus of the other sciences, but will soon move to a building near the USP Institute of Physics. Our visit during one morning was adequate to obtain an overview of the program. The majority of support for graduate students in astronomy at USP comes from FAPESP (7 masters, 26 Ph.D.), while CAPES funds 3 masters and 5 Ph.D. students and CNPq 5 masters and 2 Ph.D. students.

Organization of the visit

We made a quick tour of the campus of the observatory, and looked at the library, some graduate student offices, and the central computer facility. Independent meetings were held with most of the Faculty and with the majority of the graduate students. These discussions were lively and positive. At the close of the visit we met with Professor Barbuy, who chairs the Department, and with Associate Professor Augusto Damineli, who is in charge of the graduate program. Additional perspectives were obtained by reviewing lists of publications and other standard materials, mainly collected by CAPES, for this Department.

Evaluation of the quality of the graduate program

We have a very good impression of the overall quality of the graduate program. The Department is a mid-sized program by international standards, and compares well with equivalent scale efforts in the United States or Europe. Because of its size, the Department is able to offer a strong combination of core courses in key areas of modern astrophysics (stellar evolution, radiative processes, observational techniques, extragalactic astronomy) and electives covering more specialized areas; the formal graduate training appears to be sound. Further training is provided by the USP Advanced Astrophysics School, taught by internationally regarded lecturers.

Graduate students in the program come from São Paulo, other states in Brazil, and from elsewhere in Latin America. The advising system seems to work well, and we heard that students usually have good access to their advisors. “Sandwiches” are rare, and only a small fraction of graduate students do any of their work while they are abraod for extended time periods.

The Department is now adjusting to the changes in time to Ph.D. that are driven by the decreased duration of the fellowships. (The current time to Ph.D. with a Masters is slightly more than 8 years; the average time for a Ph.D. in the USA is 5-6 years with students completing their graduate education at an age of about 28; the fastest astrophysics Ph.D. programs are in the UK, where students graduate at the age of 25 or younger.) Part of this effort involves earlier exposure of Brazilian students to research; this is being accomplished through research experience for undergraduates at USP and other institutions in Brazil (and throughout the world). The examination system is also slated for revision. The Department is responding in a positive way in its efforts to reduce the time for graduate training.

The graduate students seem well-acquainted with the requirements for a successful research career. Most of the students work in observational areas, and for their Masters undertake a project largely of their own design using facilities in Brazil. Ph.D. thesis normally follow from the Masters and are decided in consultation with their major professor. Ph.D. theses make use of a range of international astronomical research centers.

Research in astronomy depends on access to modern research observatories on the ground and in space, computers to process these digital data and make numerical models, and a strong information technology system for access to the literature. In this latter area, rapid use of printed journals is being replaced by electronic publications. Astronomy at USP benefits from the strong support of its research infrastructure supplied by a combination of Fapesp and CNPq. The library has an excellent collection of journals and adequate range of professional monographs. Computer facilities appear to be excellent and fully competitive with similar programs in the USA or Europe. The core of the system includes very fast server machines, most Ph.D. researchers have their own workstations, and graduate students frequently have fast microcomputers. The system is professionally supported and includes a high bandwidth local area network as well as adequate access to Internet II.

Graduate students with observational research interests normally have to travel to make their observations. Much of this work at optical or infrared wavelengths initially is done at the small but well-equipped 1.6-m telescope at the national observatory in Brazil, which is oversubscribed by a factor of 3-4 for the available observing time. Use of international observatories on the ground and in space is more limited, and is normally done through collaboration arranged by a member of the Faculty. This approach can only succeed when the Faculty are viewed as competitive members of the international research community, as is the case for the majority of the USP Astronomy Faculty.

The majority of Ph.D. students make presentations (usually poster papers) at international meetings. We asked them how their level of expertise compared with that of young European or North American colleagues; they felt their work was at comparable levels.

Following the Ph.D., most students spend 1 year in Fapesp postdoctoral fellowship while they seek longer term postdoctoral positions abroad. Most students obtain these positions, often in highly competitive astronomy programs in the USA or Europe, before returning to Brazil. USP Astronomy graduates normaly seek permanent positions following the postdoc abroad. Most of these are in Brazil, with many in the private universities. Some USP graduates are starting new research programs, as in Natal, or the new graduate astronomy program in La Serena, Chile. This program is internationally known since La Serena is the home to two of the international observatories in Chile.

The acceptance of USP Ph.D. graduates as postdoctoral fellows in North America and Europe is one measure of the strength of the program. Another comes from the selection of topics for thesis research; most of these are comparable to those of competitive graduate programs throughout the world.

Reputation of the Faculty

The faculty is a major strength of the USP Department of Astronomy. A few are counted among the leaders in their research fields, and the majority are well-regarded members of the international community. The Faculty covers many of the key areas of astronomy and astrophysics, and has a reasonable multi-wavelength component and a good but small effort in theoretical astrophysics. They are aware of future possibilities, including links to physics through cosmology and high energy astrophysics, two areas that currently are receiving attention in major centers elsewhere in the world.

Scientific and technological production

The faculty produce about 2 papers in the major refereed journals per year; this is slightly below the average level for top ranked astronomy programs but lies within the dispersion of this comparison group. The papers are well-regarded and include both fundamental work and discovery science. The high quality physical facilities, strong support for students, and moderate teaching loads all contribute to the ability of the faculty to sustain excellent research prorgams.

Relative to many of their European or North American peers, the Department has a rather small instrumentation program. This is recognized to be a deficiency that is slated to be corrected through the move to the USP science campus, where more technical facilities will be available, and through a joint project with the national astronomy center (LNA) to construct a spectrograph for the SOAR 4-m telescope, in which Brazil is a partner. The SOAR Telescope and Brazilian partnership in the Gemini 8-m telescopes will be important steps for improving student and Faculty access to advanced ground-based observatories.

Institute of Physics, University of São Paulo

Overall Assessment

The reviewed program meets international standards.

Preliminary

The Institute of Physics of São Paulo is very impressive by its size. It has 112 researchers, 178 master students, and 133 Ph.D. students. In 1999, the number of thesis was 35% of the total number for the whole country.

The visit lasted 3 hours, which is too short to reach a complete and consistent overview of the scientific level of the Institute and of the ability of the program to form experienced Ph.D. scientists. We would strongly suggest to organize future evaluations on the basis of at least a whole day.

Furthermore, according to the Director of the Institute and the Coordinator of the program, they were informed by their university about our visit only 3 days before the visit itself, and this may be the reason why neither most the staff nor most of the students attended the meetings.

Another important remark is that Fapesp contributes to a dominant part of the funding of the Institute and is largely responsible for the high quality of the conditions of work of most of the staff.

Organization of the visit

In a first stage, we had a meeting with the coordinators of the six research departments, where most of the general information was provided. Then, we visited the library and a few laboratories, and we finally had a short conversation with a group of 7 students. At the end we could briefly meet Professor Salinas who is the Director of the Institute.

Evaluation of the quality of the graduate program.

Our overall impression is that the graduation program is of a very high quality, completely comparable to international standards, as compared to a mid-size graduate program in, for example, the USA. The students have the opportunity to use advanced equipment, and some of the students who are involved into experimental research seem to have built major parts of experiments during the course of their Ph.D. work. Seminars are organized at the group level as well as at the level of the whole Institute, which contribute to broadening the scope of the knowledge of the students.

The material support is also very good : they have access to a well-equipped library. Funding by Fapesp enables many students to attend international conferences or schools.

The average duration of a Ph.D. seems to be a little too long, and is of 68 months for a direct Ph.D. and of 61 months after a M.Sc.., which should be compared to the desired value of 48 months.

Representation of faculty members in the national and international community

Examination of the resumes shows that nearly all the faculty members have performed extensive research stays in foreign laboratories and that many of them have written chapters in books on specialized topics. Most of the papers mentioned in the lists of selected works (up to 1998) are in top international journals. We asked for a list of publications for 1999, but the list we were given did not mention the journals. Also worth mentioning is the fact that 6 groups have been accepted into Pronex.

Technological and scientific production of the faculty

The level of the research that we could see at the Institute is very impressive and is surely comparable to the one performed in top research Institutes of other countries.

All the groups that we have visited have reached a critical mass as far as number of researchers and equipment is concerned. Among the outstanding facilities, we saw a small Tokamak, used for Plasma physics and a Pelletron, which is an accelerator used for nuclear physics. The various other experiments that we saw were also equipped with modern equipment. All the themes of the research are well within the up-to-date international trends.

A significant fraction of the research is performed in collaboration with national and foreign Institutes.

We should mention that the various professors seem to weakly interact with each other, although they share in some cases the same experimental setups. We may speculate that the quality of the research would be even better if research occurred in a more interactive way. With the move of the Department of Astronomy to a building nearby, the opportunity also will exist to build cross–disciplinary efforts in fields of mutual interest, such as the formation of large scale structure and cosmology.

2º grupo

Consultores
John Dowell, Universidade de Birmingham, Inglaterra
Hans Otto Lutz, Universidade de Bielefeld, Alemanha

Programas
Física, UFPE
Física , CBPF
Física, UFMG

Federal University of Pernambuco

Introduction

We visited the Department on 28 March 2000 and talked separately to the staff and graduate students. We were given a tour of the facilities and visited the research laboratories. Prior to the visit, we reviewed and analysed statistical information for 1998 and some curricula vitae of the faculty members as provided by CAPES. In addition we were provided with

extensive statistical and scientific information on our arrival at the institute as well as an oral overview of the MS and PhD programmes.

The research activities of the Department are organised into three main areas:

- Condensed Matter Physics
- Optics
- Theoretical and Computational Physics

There are currently 29 permanent faculty members, 3 visitors or post-docs, 21 M.Sc. students and 25 Ph.D. students. Nine graduate courses are available. To date, the Department has produced 170 masters theses and 52 Ph.D. theses, and a total of about 1000 publications since its foundation in 1968. The rate of production is now about 12 masters and 4-5 Ph.Ds. per year, and about 60 publications in refereed journals which is around 2 per faculty member.

Personnel costs, including student support are around 3M R$ per annum. Research income is mainly project based at around 0.7M R$ from a variety of sources (UFPE, Proap-CAPES, Finep, Pronex)

Management and infrastructure

Management of the Department and of the Graduate Programme are regularly rotated among the faculty members. The laboratory space for research is adequate for the current programme and is well supported e.g. by local nitrogen and helium liquifiers. The mechanical and electronics workshops are somewhat small and lacking in modern equipment. Computing equipment is generally good but access for students could still be improved. The computers are adequately connected by a local network, but access to the internet appears to be limited by the low speed of the RNP. Overall, the staff are putting considerable effort into creating a positive research and teaching environment. However, there is a major problem in maintaining proper library facilities that is beyond the control of the staff. Reductions in funding have restricted the number of periodicals that are available.

Faculty quality and professional productivity

All professors hold a Ph.D. or D.Sc. and all either obtained their Ph.Ds. or spent periods as post-docs in institutions abroad. They all teach both undergraduate and graduate courses, all supervise graduate students, and all are research active. The majority of the research is published in high quality international journals and the publication rate of two papers per year per professor compares favourably with international standards. The Department attracts 3-4 international visitors per year and is typically involved in about seven international collaborations. This year, the University is hosting the Iupap International Conference on Magnetism (ICM).

We were impressed by the high motivation and enthusiasm of the staff members. Within each of the above-mentioned research areas the individual topics are rather broadly spread. Better focussing would improve their international visibility, better exploit the possibilities of the well equipped laboratories, and better reflect the evident scientific abilities of the researchers. Closer cooperation between theory and experiment would also aid this purpose.

Financing

The main source of research funding is project money obtained from individual applications. Unfortunately, the flow of money is not quite regular.

Students

The students were intelligent, lively and positive in attitude. They were complimentary about the research opportunities and equipment available to them, but were critical about the library facilities and access to computers and the internet. They also complained about the low funds available for travel, especially for international meetings and conferences. They regarded their communication with the advisers as being excellent and considered the level of the course material to be comparable to the best in Brazil. However, there was some variability in the quality of the lectures which are rotated among the staff. Also, small student numbers in specialised areas meant that some courses were not available every year. Regular seminars, including outside speakers, provide a stimulating environment. The mechanical workshop was regarded as a bottleneck, although the quality of the items produced was good. Funding fluctuations were also considered to be a problem affecting the progress of their research. Overall, our impression was very positive about the quality of both the M.Sc. and Ph.D. programmes.

We looked at examples of theses which are written in Portuguese. Our impression was that they are up to international standards although we could not read them in detail.

International Comparison and Ranking

Our overall impression is that the M.Sc. and Ph.D. programmes are of a very good international standard, thus confirming the conclusion of the earlier Brazilian evaluation committee. We took into account both the teaching and research aspects which conform to high standards. In our opinion the CAPES ranking of both programmes are 6 out of a maximum of 7.

Recommendations

We encourage the Department to consolidate their research programme, in particular focussing on activities that will produce the maximum impact on an international scale. This will also have a positive influence on the graduate programmes.

Centro Brasileiro de Pesquisas Fisicas – Rio de Janeiro

Introduction

We visited the institute on 29 March 2000 and talked separately to the staff and the graduate students. We were given a tour of the institute and visited the research laboratories. Prior to the visit, we received and analysed statistical information for 1998 as provided by CAPES. In addition we were provided with extensive statistical and scientific information on our arrival at the institute as well as an oral overview of the M.Sc. and Ph.D. programmes.

In both programmes, the research activities are organised into five main areas:-

- High Energy Physics
- Field Theory
- Cosmology and Gravitation
- Condensed Matter and Biophysics
- Nuclear physics

The institution was founded in 1949 as a centre for High Energy Physics but has diversified since the 1960s. There are currently 65 researchers, 21 M.Sc. students and 71 Ph.D. students, including 27 from abroad. Students are recruited in competition with the universities. Courses are available in all of the above areas. To date, the institute has produced 265 M.Sc. and 201 Ph.D. theses., and over the last few years has produced an average of about 200 publications per year with a tendency to increase. This corresponds to an average of around 3 per researcher. The rate of thesis production is currently about 10 M.Sc. and 12 Ph.D. per year with increasing emphasis on direct entry to Ph.D..

The budget for personnel is about 2M$. per year, and the budget for equipment, maintenance, library etc. another 2M$, not counting fellowships and project money. A committee determines priorities and concentrates resources in productive areas, including new initiatives.

Management and Infrastructure

Management of the laboratory is through a directorate with a director appointed for 4 years with the possibility of renewal which is helpful for long term planning. Laboratory space is good and is well supported by the necessary infrastructure needed for the different research activities and adequate technical staff. The mechanical workshop does not have modern equipment but is large and capable of producing good work. Electronics design is carried out in-house and substantial projects are undertaken Computing equipment is excellent and up-to-date. The institute is a node for a high speed link to the US and a Rio area fibre-optic network. The library facilities are outstanding and serve as a national reference library, supported by 0.5M$ per year.

Institute Quality and Professional Productivity

CBPF has a long record of research. In 1994 it was chosen as one of the Centers of Excellence in the area of Physics by the Third World Academy of Sciences. It frequently hosts scientific events such as Symposia, Workshops etc. Many of the research programmes involve international collaboration (including the US and Europe), and most of the staff has worked abroad. The majority of the research is published in high quality international journals, and the publication rate of three papers per year per researcher is high also by international standards. The average age of the staff is however increasing as the number of new posts is limited causing a reduction in staff size. Although the majority of the research is of high international standard, there is room for more innovative developments.

Financing

The regular budget from CNPq gives the institute a distinct advantage for planning and maintaining its research activities.

Students

The students were intelligent, lively and positive in attitude. They were complimentary about the research opportunities and equipment available to them. They were particularly appreciative about the library and computing facilities. They are well integrated into the research at all levels. The course structure is similar to those at universities. They regarded their communication with their advisers as being excellent. Some of the overseas students commented that the course material was of a similar standard to that in their own country. The standard of teaching was considered to be uniformly high, with a rich variety. There is a stimulating seminar programme. They felt there is no disadvantage as compared to a university environment. They complained about the difficulty to obtain support for travelling to meetings and conferences. Overall, we were left with a very positive impression.

International Comparison and Ranking

Our overall impression that the M.Sc. and Ph.D. programmes are of an excellent international standard; therefore, we have no difficulty in confirming the earlier evaluation of the Brazilian committee which gave a ranking of 6. We also considered whether a ranking of 7 might be more appropriate. We feel that CBPF has the potential to achieve this ranking by giving more attention to modern fields of research such as nanostructures.

Federal University of Minas Gerais

Introduction

We visited the Department on 30 March 2000 and talked separately to the staff and graduate students. We were given a tour of the facilities and visited the research laboratories. Prior to the visit, we reviewed and analyzed statistical information for 1998 and curricula vitae of the faculty as provided by CAPES. We were further provided with excellent statistical and scientific information on our arrival at the faculty as well as an oral overview of the M.Sc. and the Ph.D. programmes;

The research activities of the Department are organized into five main areas:

- Astrophysics
- Condensed Matter Physics
- Interdisciplinary Physics
- Mathematical Physics
- Particle Physics Theory

There are currently 45 professors in the graduate programme, 38 M.Sc. and 54 Ph.D. students. In the information leaflet, a large number of graduate courses have been listed. To date, the Department has produced 239 masters theses and 81 Ph.D. theses, and about 80-90 publications per year in the last 4 years, with a tendency to rise. This corresponds to an average of around 2 per researcher per year. The rate of theses production is currently around 13 M.Sc. and 15 Ph.Ds. per year with a rising trend.

Research income is mainly project based at around 1 to 1.5 MR$ per annum from a variety of sources (Pronex, Finep, Fapemig).

Management and infrastructure

Management of the Department and of the Graduate Programme are rotated among the faculty members. There is a departmental committee to determine the research policy. The laboratory space for research is adequate for the current programme and is well supported e.g. by local nitrogen and helium liquifiers. The mechanical workshop is a bit small and lacking modern equipment but capable of producing the necessary equipment. The computing facilities are excellent with good networking and plenty of installed computer power for all research and teaching purposes. Access to the internet appears to be limited by the low speed of the RNP. The research programme is extremely well organized with a very efficient use and planning of resources. We consider the infrastructure and the collaboration between the groups to be excellent. However, there is a problem in maintaining proper library facilities that is beyond the control of the staff. Reduction in funding have restricted the number of periodicals that are available.

Faculty quality and professional productivity

All professors involved in the graduate programme hold a Ph.D. or equivalent. A large majority either obtained their Ph.Ds. or spent periods as post-docs in institutions abroad. All supervise graduate students and all are research active. The majority of the research is published in high quality international journals and the publication rate of two papers per year per professor compares favorably with international standards. Each researcher has some collaboration overseas. The Department attracts typically 3 visitors per year.

We were impressed by the high motivation, enthusiasm and imagination of the staff members. A high proportion of the research is at the frontier yielding a high citation rate. The hiring policy is supporting this development, e.g., the last appointment has been in nanoscale physics. There is a good connection between theory and experimental groups.

Financing

The main source of research funding is project money obtained from individual applications. Unfortunately, the flow of money from some sources is not quite regular.

Students

The students were intelligent, lively and positive in attitude. They were complimentary about the research opportunities and the equipment available to them, including computer facilities. They complained about low funds available for travel, especially for international meetings and conferences. They regarded the communication with their advisers as being excellent and considered the level of the course material to have international standard. They had a high opinion of the quality of the professors and their willingness to respond their needs. Regular seminars, including outside speakers, provide a stimulating environment. Overall, our impression was extremely positive about the quality of both the M.Sc. and the Ph.D. programmes.

International Comparison and Ranking

Our overall impression is that the M.Sc. and Ph.D. programmes are of excellent international standard; therefore, we have no difficulty in confirming the earlier evaluation of the Brazilian committee which gave a ranking of 6. However, in our opinion a ranking of 7 is more appropriate in view of the excellent organization of research and teaching which provides both a high degree of coherence and international visibility.

3º grupo

Consultores
Gilles Cohen-Tannoudji, CEA, Paris
José Luis Móran Lopez, Universidade Autônoma de San Luís Potosi, México

Programas
Física, Unicamp
Física, USP/SC

Institute of Physics, State University of Campinas (Unicamp)

Visit Agenda: The visit was carried out as following.

9h Presentation of the program.

The program was presented by the Director of the Institute, Carlos de Brito Cruz with the presence of the Graduate Course Coordinator, Guillermo Cabrera and some Members of the Faculty. Our comments are the following:

1. The presentation of the programs was very well organized and fully documented. The director presented actualized statistics and information on the results in the last years.
2. The faculty consists of 96 members. About 60% of them works on experimental physics and the rest do theory.
3. The faculty looks very solid; with some exceptions they are very active. The productivity in the last five years is above the international standards: in 1996, 1998 and 1999 exceeds 2 publications per faculty member. The papers are published in international journals with high impact parameter.
4. About 65 % of the faculty are awarded with a CNPq Research Fellowship. This institute is the second at the national level (after the Physics Department of Federal University of Pernambuco).
5. The funds obtained for research are considerable; for example in 1999 the total funds sum more than 14 million US dollars. This manifest a very active faculty.
6. The number of students in the M.Sc. and Ph.D. programs has kept almost constant during the last five years and fluctuates around 60 and 130, respectively. It is important to note the larger number of Ph.D. students as compared those in the M.Sc. program. The number of graduated students per year in the M.Sc. and Ph.D. programs fluctuate around 20.
7. The time necessary to finish the programs is around 26 and 50 months, respectively.

8. These numbers lead to the conclusion that each faculty member graduates on the average 1 Ph.D. and 2 M.Sc. per year. These numbers are on the international level.

10h15 Meeting with the faculty members.

The meeting with the faculty members was interesting and we heard various opinions about the graduate program. The most important from those was that the library should get more support to keep the journal subscriptions.

11h Visit to some laboratories, the computer center and the library.

We visited the laboratories of the Quantum Electronics and Applied Physics Departments. It is remarkable the success that some projects like the one on optoelectronic communications has had. They have as a results important collaboration programs with international leading companies.

The library is well organized and contains about 350 subscriptions to the best international journals. From them 80 are on line. The number of books is also adequate. All the students have access to the library.

The computer center is well equipped and offers an efficient service to the whole academic community. All the students have electronic mail address.

12h Meeting with the students.

Most stimulating was the meeting with the graduate students. To the meeting attended 71 students. Through a very lively discussion we had the opportunity to listen the opinion from the students.

In general they were happy about the facilities, organization and administration of the program. We just mention some opinions:

1. Bureaucratic attitude of the administrative employees.
2. Lack of information about how to obtain support for attending conferences and meetings.
3. Lack of evaluation about the quality of the courses.
4. Few options to select a teacher for basic courses.
5. Few offers for teacher assistants.

13h15 Final meeting with the Institute authorities.

Finally we met with the Director of the Institute and the Coordinator of the Graduate Programs to comment on whole visit. We obtained additional information and answers to our questions.

Institute of Physics, University of São Paulo at São Carlos (USP/SC)

Visit Agenda: The visit was carried out as following.

8h45 Presentation of the program.

by the Vice-Director of the Institute, Luiz Nunes de Oliveira with the presence of the Director, Horacio Carlos Panepucci, the President of the graduate commission, Roberto Mendonça Farias and some members of the faculty.

Our comments are the following:

1. The presentation of the programs was very well organized and fully documented. The Vice-director presented actualized statistics and information on the results in the last years.
2. The total number of faculty members is 56. From them 43 are advisors.
3. The faculty looks very solid; with very few exceptions they are very active. The productivity in the last five years is above the international standards: in the last two years the number of publications per faculty member exceed three. The papers are published in international journals with high impact parameter.
4. About 40 % of the faculty are awarded with a CNPq Research Fellowship. This institute is the sixth at the national level.
5. The funds obtained for research are considerable. From Fapesp in 1999 they obtained 3 million US dollars.
6. The number of students in the M.Sc. and Ph.D. programs in this year is 54 and 107, respectively.
7. The time necessary to finish the programs is around 29 and 55 months, respectively.
8. The number of M. Sc. and Ph.D. theses in the last three years is 28, 30, 52, and 35, 39 and 39, respectively. These numbers lead to the conclusion that each faculty member graduates on the average almost 2 Ph.D. and 1 M.Sc. per year. These numbers are on the international level.

10h Meeting with the faculty members.

The meeting with the faculty members was interesting and we heard various opinions about the Graduate Program. The most important from those were the many international collaboration programs carried by the Faculty members.

10h30 Meeting with the students.

Most stimulating was the meeting with the graduate students. To the meeting attended more than 100 students. Through a very lively discussion we had the opportunity to listen the opinion from the students.

In general they were happy about the facilities, organization and administration of the program. More than half of them receive a fellowship from Fapesp. Here we collect some opinions that coincide with others heard in Campinas:

1) Bureaucratic attitude of the administrative employees.

2) Lack of information about how to obtain support for attending conferences and meetings.
3) The students that receive a fellowship from Fapesp make more frequent use of the funds to attend meetings or schools.
4) Lack of evaluation about the quality of the courses.
5) Few options to select a teacher for basic courses.

11h30 Visit to some laboratories and the library.

We visited the laboratories for research in materials science and molecular physics and biophysics. It is interesting to note the interdisciplinary characteristics of many research projects.

The optics group, leaded by Salvador Bagnato, performs projects that go from the fabrication of microscopes to ophthalmic instrumentation, to very basic research on Bose condensation.

Other important project is the one carried out on magnetic imaging for medical purposes. They have developed a tomographyc machine that is used in a diagnostic center.

One more important project is the one on protein characterization and genetic modification for medical purposes. This group was the first in carrying experiments under microgravity conditions in a space shuttle experiment.

The library is well organized and contains 391 subscriptions to the best international journals. From them 100 are on line. The number of books is more than 20000. All the students have access to the library until 10 pm and on Saturdays.

12h45 Final Meeting with the Institute authorities.

During lunch time we met with the Director of the Institute, the Vice-Director of the Institute, and the President of the Graduate Commission to comment on the activities carried out on the whole visit. We obtained additional information and answers to our questions.

Referee Remarks

In the following we give first some remarks that were produced after visiting the National Laboratory of Synchrotron Light (LNLS) and after we make some general observations.

Remarks after the visit of the LNLS

Thanks to the proximity of the National Laboratory of Synchrotron Light (LNLS, the only synchrotron in the southern hemisphere), the Institute of Physics Gleb Wataghin of the State University of Campinas (IFGW) graduate school has a unique opportunity to become a world class interdisciplinary scientific and technological center oriented towards emerging fields of research. The very impressive visit to the LNLS leads us to do the following remarks.

· It seems to us that the scientific organization of the IFGW is not yet well adapted to such an evolution: the structure of the departments (Cosmic Rays and Chronology, Condensed Matter, Quantum Electronics, Applied physics) looks quite traditional. The one adopted in the IFSC is, in our opinion, much better oriented towards interdisciplinary and emerging

fields: Physics, Material Sciences, Molecular Physics and Biophysics, with an infrastructure of Computation and Instrumentation.

- The program of courses could also, in our opinion, take more advantage of the opportunity given by the Synchrotron. During his or her stay in the IFGW; a graduate student should use, at least once, this facility, and should be taught about its multidisciplinary uses. Most of the Ph.D. graduated in the IFGW should be known as experts in the use of synchrotron radiation.
- The Institute of Physics of the University of São Paulo at San Carlos (IFSC) is also a user of the synchrotron, so it could be wise to create a scientific council, common to LNLS, IFGW and IFSC (and also to other institutes in other disciplines, like chemistry and biology), with international and industrial representations, which would help to optimize the use of the synchrotron, the scientific organization of the institutes and the programs of graduate courses.

General Comments

Post-docs

We have appreciated that both institutes offer a good number of post-doc positions for national and international young researchers. We strongly recommend funding agencies to continue to support this feature which is essential for the vitality of research.

Alumni

An important remark we can do concerns the way how the alumni are followed after the completion of the graduate programs. Data in the IFGW are not very accurate, (not as accurate as in IFSC), and this should be improved. We have the impression that the concern about the future of Ph.D., which is rather strong among students, is not as strong among the faculty. The students seemed to us more organized than in the IFSC.

Communication between students and faculty

When talking to the students we have not found more problems (like misfits between students and their supervisors) than in any other graduate school in the world, but we got the impression that they do sometimes occur. We suggest to implement as in other countries, a sort of an observatory of the completion of the theses, implying for each student, an annual short activity report, and an interview with a faculty member independent of the supervisor.

Comments common to the two Institutes

We want to conclude by a general comment which is valid for both institutes we visited. The two graduate programs are excellent. They contribute as much as they are supposed to do, namely the building of a solid scientific basis for the benefit of the whole country. This basis is growing in a very healthy way, and it has still a large potential of growth. We are lacking information about the response of the Brazilian industrial community to this endeavor, and we think it is the responsibility of the funding agencies to look for this response. As far as the scientific quality of the programs is concerned, we think that for both institutes, the answer to the

four questions asked at the end of the visit program (points to be emphasized in the final report) is, with no doubt, yes.

1. The quality of thesis and scientific production is compatible with a high quality graduation program.
2. There is strong evidence that a significant number of faculty members (almost all of them) have a role of leadership and representativeness in their own national and international community.
3. The technological and scientific production of the faculty is relevant according to international standards, and this production is well distributed among the faculty members.
4. The program compares quite well with similar international high quality programs.

For the moment one does not see strong threat of unemployment for young doctors, which justifies a rather long duration of graduate studies. If this growth continues, problems may appear in few years. One has to be ready to confront these problems. In this respect, we have appreciated the endeavor in the IFGW to shorten the master and doctorate times of completion. We have also appreciated the increase of the number of doctorates with respect to the number of masters. As long as the duration of the graduate studies will be maintained, one should take advantage of it.

· to provide all students with the largest possible spectrum of multidisciplinary knowledge, in theory and in experiment, to allow them thematic mobility and flexibility,

· to provide all students with programs (which could imply some stays in industrial companies) of "training through research", that is of training to activities related to research, like teaching, management, computation, modelization, etc.

One minor final point. We find that the time dedicated to each visit should be at least a whole day. A shorter time does not permit a complete evaluation.

Resumos traduzidos e organizados por consultores da CAPES

1º grupo:
Profs. J.S. Gallagher III e
D. Paget

· **Física – USP** – os números impressionam: 112 pesquisadores, 178 alunos de M.S. e 133 de D.S., e as teses defendidas em 1999 somam 35% do total nacional. A visita de 3 horas foi insuficiente, sugere-se fortemente um dia por programa. A impressão geral é de alta qualidade em padrão internacional. Os alunos dispõem de equipamento avançado, há bons seminários, a biblioteca é bem suprida e a Fapesp apóia participações em eventos no exterior. A duração é longa (68 meses para doutorado). Quase todos os docentes possuem experiência de pesquisa no exterior; muitos fizeram capítulos de livros, a maioria dos artigos listados estão em jornais de 1ª linha (até 1998, sem dados para 1999), e há 6 grupos Pronex. O nível da pesquisa é excelente e comparável ao de instituições de topo no exterior; todos os grupos possuem massa crítica e equipamento adequado: destaca-se o Tokamak (física do plasma) e o Pelletron (acelerador). Todos os tópicos de pesquisa seguem a tendência internacional, e boa parte é feita em cooperação com IES do País e do exterior. Contudo, vários docentes parecem interagir fracamente no meio interno, a qualidade da pesquisa melhoraria se isso fosse superado. A construção do prédio vizinho de Astronomia possibilitará esforços transdisciplinares.

· **Astronomia USP** – de porte médio, possui 24 docentes permanentes e 50 alunos, de modo que o prazo de meio dia para a visita foi suficiente. A maior parte das bolsas vem da Fapesp,

seguida pela CAPES e pelo CNPq. A impressão geral é muito boa: o programa se compara bem a outros de mesma escala nos EUA e EU. Pode combinar bem cursos em áreas modernas (Extragalática, Evolução Estelar, Radiação etc.). A formação parece adequada, e o treinamento posterior é ministrado pela Escola de Astrofísica Avançada, por professores de reputação internacional. Os alunos vêm de todo o País e da América Latina e são bem orientados; contudo, há poucas bolsas sanduíche e poucos passam períodos longos no exterior. O programa está buscando a redução do tempo das titulações, adequando-se ao critério internacional. Os alunos parecem preparados para a carreira de pesquisa; a maioria é da área observacional. Enquanto os trabalhos de mestrado são feitos com dados do Brasil, os de doutorado utilizam dados de centros de todo o mundo. A infra-estrutura de pesquisa aproveita-se de convênio Fapesp/CNPq; a biblioteca é excelente, bem como os computadores, servidores e redes (também Internet II). A observação é feita em pequeno mas bem equipado telescópio 1,6 m; há uso de instalações no exterior, possível por contatos pessoais, o que só ocorre se há boa reputação, e tal é o caso. Os alunos costumam apresentar posters em eventos no exterior e comparam seu trabalho com o dos outros alunos. Após o doutorado, muitos usam a bolsa de recém-doutor da Fapesp, após isso muitos vão para pós-doutorado em grandes centros no exterior; na volta vão para IES privadas ou novos programas, como em Natal e La Serena-Chile. A força do programa prova-se pela aceitação de doutores no exterior e pelos temas das teses. Dos docentes, uns poucos são líderes em seu campo, mas a maioria são membros destacados da comunidade internacional; cobrem muitas das áreas-chave, mas há pouco destaque em Astrofísica Teórica, embora estejam preparados para áreas emergentes. A produção anual por docente é de 2 artigos nos principais jornais (dentro da média dos programas de topo), o que se atinge pela boa estrutura, apoio a alunos e moderada carga letiva. Uma deficiência é o programa de instrumentação, que deve melhorar com a mudança para o campus central e o convênio para construção de um espectrógrafo para o telescópio SOAR 4.

· **Física UFRGS** – possui 60 docentes e 105 alunos (66 de D.S.), atuando principalmente em Física Experimental, Teórica e Astronomia, esta última com ênfase menor. O programa está prejudicado este ano pelos cortes da Finep e do PADCT; 3 grupos estão no Pronex e 2 entrarão em breve (o aporte deste ano é 20% dos anteriores): há que se despender tempo para obter novos financiamentos. A impressão inicial é de que o programa é muito bom e de padrão internacional, mas necessita de fundos adicionais. Os estudantes dispõem de equipamento moderno; os de Astronomia têm experiência observacional no País e, mais raramente, no exterior. A biblioteca é bem equipada, embora alguns cortes devam ser feitos em razão do corte de verbas; por outro lado, novos computadores acabam de ser instalados. Os tempos médios de formação são de 25 e 53 meses, próximos aos recomendados, e a seleção de candidatos é intensa (15% de aprovação e 11 aprovados de 30 candidatos para o mestrado neste ano. Os alunos gostariam de ter mais disciplinas e dizem que os critérios de seleção mudam a cada ano e nunca são claros, e que não têm acesso a eventos no exterior e a outros centros de pesquisa. Em geral, a pesquisa é de nível internacional, com resultados sólidos em alguns pontos; o programa atingiu massa crítica em assuntos atuais (filmes finos, sol-gel, cerâmicas, supercondutores, feixe de íons, altas pressões). De acordo com os artigos, o nível do grupo teórico é bom. O grupo de astronomia escolheu bem sua subárea (Extragalática, evolução estelar etc.) e possui parceiros internacionais; sua produção (3 artigos/docente em bons *journals*) é de alto nível internacional, formou egressos hoje líderes em sua área e se aproveitará de novas técnicas de observação e bancos de dados astronômicos em breve. O programa dispõe de vários aceleradores de íons, investigando metais, polímeros, etc.; há outros laboratórios bem equipados, muitos com aparatos construídos no departamento, e estão sempre ocupados por alunos. A rede de informática é adequada, mas o acesso à Internet não é tão moderno. Tal é o caso da Astronomia, o que é esperado considerando seu tamanho (9 docentes). A cooperação entre o grupo teórico e o experimental (especialmente em magnetismo) poderia melhorar. Alguns docentes buscam ter relações com a indústria, o que é recomendável; as cooperações são claramente insuficientes, embora já haja algum sucesso, especialmente em Ótica.

2º grupo:
Profs. J. Dowell e H.O. Lutz

· **Física – UFPE:** as entrevistas com docentes e alunos, bem como a visita às instalações, foram precedidas por análise de estatísticas e currículos. Há 29 docentes permanentes e 46 alunos (25 doutorandos), com uma média anual de 2 artigos por ano (padrão internacional), divididos nas três áreas principais: Matéria Condensada, Ótica e Física Teórica e Computacional. O espaço dos laboratórios é adequado; a oficina é um tanto antiquada mas eficaz, e os computadores, embora adequados, poderiam ser mais acessíveis aos alunos e melhorar a ligação com a Internet. Os esforços dos docentes em melhorar o programa não podem resolver o problema da restrição de periódicos na biblioteca. Todos os docentes fizeram seu doutorado ou pós-doutorado no exterior, orientam alunos e fazem pesquisa, cujos resultados são publicados em sua maioria em veículos de 1ª linha. O programa atrai 3 a 4 visitantes internacionais por ano e possui sete convênios com o exterior; este ano sedia a Conferência Internacional de Magnetismo. O entusiasmo dos docentes é patente. Alguns tópicos de pesquisa são abrangentes demais; uma melhor focalização (e maior relação teoria/ experimentação) resultaria em maior visibilidade no exterior, maior aproveitamento dos laboratórios e das habilidades pessoais. O aporte de recursos vem de projetos individuais e é algo irregular. Os alunos são inteligentes e ativos; embora elogiem a pesquisa, os equipamentos, o material e a orientação, queixam-se da biblioteca e do acesso a computadores/Internet, e das dificuldades em irem a eventos, especialmente no exterior. Há seminários freqüentes, e as teses parecem ser de nível internacional. O programa parece ser de alto padrão internacional, e a nota 6 é adequada. Recomendações: deve-se consolidar a pesquisa e concentrá-la em áreas de maior impacto no meio externo.

· **Física – UFMG:** o programa divide-se em Astrofísica, Matéria Condensada, Física Matemática, Partículas e área Interdisciplinar, com 45 docentes e 92 alunos (54 doutorandos), e uma média anual de 2 artigos/docente (taxa crescente, assim como o número de teses/ano). A pesquisa é financiada por várias fontes oficiais. O espaço dos laboratórios é adequado; a oficina, embora antiquada, é eficaz, e os computadores são excelentes, apesar de se dever melhorar a ligação com a Internet. Apesar da ótima cooperação entre docentes, há o problema da restrição de periódicos na biblioteca. A maioria dos docentes fez doutorado ou pós-doutorado no exterior, e todos orientam alunos e fazem pesquisa, cujos resultados são publicados em sua maioria em veículos de 1ª linha. O programa atrai 3 visitantes internacionais por ano, todos os docentes têm colaboração com o exterior e são altamente motivados. Grande parte da pesquisa está na fronteira e tem alto índice de citação, e as contratações seguem esse padrão, a última foi de física nanométrica. O aporte de recursos vem de projetos individuais e é algo irregular. Os alunos são inteligentes e ativos, satisfeitos com a pesquisa, equipamentos, computadores, material e orientação, só queixam-se das dificuldades em ir a eventos, especialmente no exterior. Há seminários freqüentes. O programa parece ser de excelente padrão internacional, e sugere-se a nota 7, em razão da organização, da pesquisa e do ensino excelentes, que possibilitam grande coerência e visibilidade internacional.

· **Física – CBPF:** atua nas áreas de Altas Energias, Teoria de Campos, Cosmologia e Gravitação, Biofísica e Matéria Condensada, e Física Nuclear, possuindo 65 pesquisadores, 92 alunos (71 doutorandos e 27 estrangeiros), já tendo formado 265 mestres e 201 doutores. A média anual por docente é de 3 artigos (maioria em jornais de 1ª linha) e de tendência crescente, bem como a produção de teses. O espaço dos laboratórios é adequado e eles são bem equipados; a oficina é antiquada, mas eficaz, e os computadores são excelentes: o CBPF funciona como portal de rápido acesso aos EUA e nó da rede de fibra ótica do Rio. A biblioteca é excelente e de referência nacional, com orçamento de R$ 0,5M. O curso mantém longa tradição de pesquisa (fundado em 1949), em 1994 torno-se centro de referência da Academia de Ciências do III Mundo e freqüentemente sedia eventos. A maioria dos convênios é internacional, e a maior parte do quadro já trabalhou no exterior. A idade média está aumentando e os novos postos são limitados. Apesar da alta qualidade da pesquisa, há

espaço para maior inovação. O financiamento regular do CNPq confere ao programa significativa vantagem. Os alunos são inteligentes e ativos, satisfeitos com a pesquisa, os equipamentos, a orientação e, principalmente, com a biblioteca; estão bem integrados na pesquisa em todos os níveis. A estrutura do curso é similar a de universidades, e o ensino de alto nível, variado e uniforme; os alunos estrangeiros comentam a semelhança com o padrão de seu país. Os alunos só queixam-se das dificuldades em ir a eventos, especialmente no exterior. Há um excelente programa de seminários. O programa parece ser de excelente padrão internacional, e sugere-se a nota 7: o CBPF tem potencial para isto, e deve dar maior atenção a áreas modernas como a nanoestrutura.

3º grupo:

Profs. G.Cohen-Tannoudji e J.L. Moran-Lopez

- **Física – Unicamp:** possui 96 docentes, dos quais 60% da área experimental e o restante da teórica; nos últimos 5 anos a produção média anual tem sido de 2 artigos/docente, em *journals* de alto impacto. 65% possuem bolsa do CNPq, e em 1999 o total de recursos levantados foi de U$ 14 M. O número de alunos de mestrado e doutorado, 60 e 130 respectivamente, manteve-se constante nos últimos 5 anos, com média de titulação em 26 e 50 meses. A relação alunos/docentes está no padrão internacional. Da entrevista com os docentes depreendeu-se a necessidade de manter as coleções da biblioteca, que possui 350 assinaturas (80 online) dos melhores jornais. Os projetos de optoeletrônica são muito bem sucedidos e resultaram em importantes convênios internacionais; os computadores são bons e acessíveis. Houve entrevista com 71 alunos, em geral satisfeitos com o programa, mas que observam: burocracia dos funcionários, dificuldades em obter apoio para eventos, falta de avaliação das disciplinas, falta de opção para professores de cursos básicos e falta de ofertas para assistente de ensino.

- **Física – USP/SC:** o programa possui 56 docentes, dos quais 43 são orientadores, a grande maioria é muito ativa: a produção anual por docente é superior a 3 artigos (em jornais de grande impacto), nos últimos 5 anos, acima do padrão internacional. 40% dos docentes possuem bolsa do CNPq; o suporte da Fapesp em 1999 foi de U$ 3M. Há 57 alunos de M.S. e 107 de D.S., com média de titulação de 29 e 55 meses, e o número de alunos por orientador segue o padrão internacional. Relataram-se muitos projetos de cooperação com IES do exterior. Mais de 100 alunos participaram da entrevista; em geral estão satisfeitos com o programa e fazem queixas similares às da Unicamp: burocracia dos funcionários, dificuldades em obter apoio para eventos (os bolsistas da Fapesp obtêm apoio), falta de avaliação das disciplinas, falta de opção para professores de cursos básicos. Os projetos possuem características interdisciplinares; o grupo de ótica atua desde a pesquisa básica até a Condensação de Bose. Deve-se também citar o projeto de imagens magnéticas para fins médicos, que desenvolveu um tomógrafo, e o de caracterização protéica e alteração gênica, que foi o 1º a realizar experimentos sob microgravidade em ônibus espacial. A biblioteca é bem organizada e possui 391 assinaturas dos melhores veículos (100 online), e mais de 20.000 livros.

- **LNLS:** a proximidade do LNLS confere à Unicamp a oportunidade única de ser um centro interdisciplinar de pesquisa em áreas emergentes. Contudo, o programa não está ainda adaptado; algumas áreas (Raios Cósmicos, Quântica etc.) parecem muito convencionais, o programa da UFSCar é melhor orientado nesse sentido. As disciplinas poderiam tirar proveito das oportunidades do Síncrotron: o aluno deveria pelo menos uma vez utilizá-lo e aprender seus usos, e a maioria dos doutorandos deveria ser especializada no assunto. Como a UFSCar também faz uso do LNLS, poderia ser criado um conselho das 3 instituições , visando melhor aproveitamento de recursos e convênios.

· **<u>Comentários gerais</u>:** é bom que os 2 programas ofereçam pós-doutorado (também para estrangeiros), recomendando-se a continuidade do apoio pelas agências oficiais. Deve haver um programa mais eficiente de acompanhamento de egressos. Sugere-se um controle da elaboração de teses, com relatórios anuais sucintos. Os dois programas são excelentes, contribuindo muito para a formação de uma sólida base científica nacional. Há falta de dados sobre a resposta do setor industrial a isso, e as agências de fomento deveriam compilá-los. A resposta às 4 questões avaliativas (qualidade internacional de teses e artigos, liderança e representatividade dos docentes, produção técnico-científica bem distribuída e de padrão internacional, e comparabilidade aos programas internacionais de alta qualidade) é *sim*. Deve-se estar preparado para uma futura falta de emprego para jovens doutores, ainda não preocupante. Aprecia-se a redução do tempo de formação na Unicamp, e o aumento de doutorandos em relação aos mestrandos. Recomenda-se ainda: prover o aluno do mais largo espectro possível de conhecimento, permitindo sua mobilidade temática e treinamento de pesquisa (ensino, computação, modelagem, gerência etc.). Para a CAPES: o tempo de visita deveria ser de um dia completo.

Avaliação Internacinal da Pós-graduação

Química

Concomitantemente à Avaliação Internacional da pós-graduação nas área de Física, a CAPES empreendeu o mesmo procedimento para a área de Química. Assim, os programas de nota 6 ou 7 na Avaliação de 1998 foram visitados por comitês de examinadores estrangeiros, sendo os relatórios originais elaborados e o seu resumo traduzido publicados a seguir.

1º grupo

Consultores
Klaus Hafner, Universidade Técnica de Darmstadt, Alemanha
Dennis Stynes, Universidade de York, Canadá

Programas
Química, UFPE
Química Orgânica, UFRJ
Química, UFMG

General Remarks

The purpose of this exercise was to visit each of the above programs and assess the overall quality especially with respect to the following points.

· Is the quality of the thesis and scientific production compatible with a high quality graduate program?

· Is there evidence that the faculty members play a significant leadership in their local, national, and international community?

- Does the technical and scientific production of the faculty meet international standard and is it concentrated within a few members or distributed throughout the faculty?
- How does the program compare with similar international high quality programs?
- What are the strong and weak points of the programs?

In general each program provided us with detailed information about student numbers, faculty publications and other statistical data. An overview of research activities was provided and time permitted a tour of the laboratory facilities and major equipment installations. We were provided copies of examinations and selected M.Sc. and Ph.D. theses to review. We met with graduate students in the absence of faculty in order to freely solicit their assessment of the programs. In the case of UFRJ only three students were selected to meet with us while at UFPE and UFMG the majority of the enrolled graduate students were present. Time did not allow for a detailed discussion of research activities with individual researchers.

Graduate student training

All three programs have a well-planned and rigorous course of studies for the M.Sc. and Ph.D. degrees. This includes all of the following:

- entrance examination to enter the M.Sc. program;
- substantial course requirements providing breadth and depth;
- examinations were found to be at international standards;
- students regularly attend seminar programs and are required to present seminars as well;
- in some cases students must present and defend research proposals outside the area of their thesis topic.

In general the programs were found to provide a stimulating and scholarly environment in which to carry out research. There was evidence of extensive collaboration between groups , especially at the smaller program at UFPE and the larger one at UFMG. At UFPE this took the form of several groups contributing to different aspects of research involving luminescent lanthanide complexes.

Student quality

The reviewers were especially impressed with the quality of the students. We must necessarily rely on those fluent in English although our Brazilian member was available to interpret responses in Portuguese for us. Students were enthusiastic about their programs and spoke highly of their professors. As in international institutions some of the best students were capable of significant independent contributions while others work much more closely with their supervisors. Additional evidence of student quality comes from the results of ‘’sandwich’’ programs in which students spend some time at North American or European institutions. Some students have completed Ph.D. degrees abroad following their M.Sc.. These students in general are of a quality comparable to those in North America and Europe.

When asked about future plans almost without exception students intend to obtain employment within the Brazilian university system. This creates a problem which we address later in this report. Students are coauthors on about 70% of the publications. They told us they spend over 50 hours per week on their research and we found them actively engaged in the labs during our visit.

Faculty quality

Overall the faculty quality is high. All have the Ph.D. degree and about half have some experience abroad either as graduate students, postdoctoral fellows, as visiting professors or through colloborative arrangements. Many have continuing research collaborations with groups in the USA, Europe, and Canada. This is a very important feature of the chemistry departments in Brazil and is an effective way of maintaining international standards in the discipline as well as promoting Brazilian research abroad.

On the basis of discussions with students the faculty are readily available to help students both within and external to their groups. They appear to provide a stimulating and also friendly environment which is important to an efficient research group. Thesis topics are relevant sometimes to local themes. A good example is a project at UFMG directed toward analysis and restoration of local art with chemical methods. The majority of thesis topics relate to fundamental problems in chemistry. These are timely and relevant and are deemed to meet international standards.

Publication Record

The number of publications for each department is considered reasonable by international standards. This assessment takes into account the lack of postdoctoral fellows in the Brazilian system and a generally lower level of financial support. Considerable importance is placed on publications in international journals with high impact factor. The general pattern found was that some faculty had published extensively in such journals while others had the bulk of their contributions in lesser known journals. It appears that this trend is changing with an increasing number of younger faculty submitting their work to high quality journals of high international stature. These faculty are almost always those with foreign experience or collaboration.

Infrastructure

We found a considerable variation in the infrastructure of the three programs we assessed. In the case of UFPE there is a lack of equipment needed to mount a comprehensive chemistry program in all areas. It is clear that several research programs are directed towards what is possible. Several faculty mentioned projects of greater interest to them which are not currently feasible with the available resources. One area which is highly developed at all three programs is computational chemistry as the computational facilities are adequate for these studies. Libraries were visited at UFPE and UFMG. These had collections of most of the leading international journals but in several cases there were gaps in the holdings because of irregular funding. The number of textbook and specialized monographs is small compared to international standards and efforts should be made to remedy this. A computerized system which allows students to obtain copies of material not available locally seems to be working well at UFPE. Also each institution is well connected through the internet.

Another problem cited by both faculty and students is the difficulty in obtaining chemical reagents. In many cases several months are required to obtain essential reagents. These limitations serve to extend the time required to complete degree programs.

Specifics of the Programs Visited

Having assessed features common to all three programs we now turn our attention to the specifics of the three programs we visited.

UFPE

Our visit to Pernambuco was nicely planned and very well organized locally. This is a relative new program which graduated its first Ph.D. in 1996. It has grown to produce seven Ph.D. graduates in 1999. The chemistry program relies heavily on close collaboration between different groups across a range of subdisciplines including physical, inorganic, computational, organic chemistry. There also is cooperation between chemistry, physics, and biology. The program draws students mostly from the northeast region and serves as a center for the region. The advantage of the small program is the close collegiality it produces. Students spoke favorably about this aspect of the program. A disadvantage is that the students have a more limited range of research topics to choose from. The faculty quality is high but not uniformly so. There are 23 permanent faculty two of whom are members of the Brazilian Academy of Science. The more senior faculty have the greatest international reputation and these provide the majority of high quality publications. This program could benefit greatly from greater infrastructural support. A new building is under construction and this along with additional equipment would greatly strengthen the program.

UFRJ

The assessment of this program differs from the others in that only the organic chemistry program was viewed. Three different aspects of the program were presented to us. These include the basic organic program which includes groups involved in organic synthesis, natural products, and molecular modelling. These areas complement each other well. A second component is an analytical facility for drug analysis and doping control. A third component located in a separate building involved more applied projects in organic geochemistry, polymeric and ceramic materials, industrial waste utilization, and catalysis.

Strong points of the program include a well organized NMR lab and an active molecular modelling group. We are not clear on the relationships between the more applied projects of “Polo de Xistoquimica” and the core organic program and these parts did not seem to be well integrated with the rest of the program. The equipment we viewed within this applied facility seemed to us antiquated.

UFMG

The presentation of this program was the best by far of the three. Several faculty made brief but informative outlines of a wide range of research topics covering all of the subdisciplines of chemistry. We were also provided with a wealth of well organized documentation supporting the strength of the program including course descriptions, publications, seminar lists, and colloborations. Our visit with students was stimulating. During our tour of the labs students were engaged in experimental work and most equipment was being operated. A range of research areas were active. Topics include chemical and microbiological transformations of natural products, organic synthesis, bioinorganic chemistry. Mössbauer spectroscopy, X-ray crystallography, materials science, coordination chemistry, theoretical and computational chemistry. In our view the broad range of research topics available within this program provides an excellent education for graduate students. The program is further strengthened by cooperations with local industry which contribute research funding as well as scholarship support. The applied aspects of the program are better integrated and more appropriate than was the case at UFRJ. The instrumental facilities were excellent. The NMR facility has two highly

trained technicians and provides service both inside and outside the university. The same can be said for other analytical services. In addition to centralized instrumental labs, most of the research labs were also well equipped with modern instrumentation. Technical support was in fact superior to that found at most North American and European institutions.

Scores

It is difficult to incorporate all of the complexities of these different programs within a single number but we have been requested by CAPES to do so. We are aware of the previous evaluations of these programs and largely agree with the evaluations made independently by CAPES. We also concur with the criteria used by CAPES which places an emphasis on international standards.

UFPE

We rate this program a 6 on the CAPES scale. While it is a smaller program and lacking somewhat in resources, it has a solid base of faculty and has developed significantly in the short period since it began. It requires some investment in equipment and funding in order to broaden the focus of the program.

UFRJ

We rate this program a 6 on the CAPES scale. We would prefer that the entire chemistry department be more closely integrated in order to provide a comprehensive chemistry program and that this larger entity be evaluated by CAPES. This department is relatively well equipped and has a large number of students.

UFMG

We rate this program a 7 on the CAPES scale. It is a well equipped., and effficiently organized department. Research areas cover a broad range of topics with excellence in several of them. It has made effective use of collaborations with local industry as well as internationally with other universities.

Recommendations

Below we highlight a few of the weaknesses we find and some recommendations.

Time to complete degree

The average time to complete degrees is excessive by international standards and costly for both the university and the students. Efforts should be made to identify the strongest students and have them proceed directly to the Ph.D. without writing an M.Sc. thesis. A five year period between BSc and Ph.D. is considered more reasonable.

International Experience

Increased opportunities for students and faculty to study or do collaborative research in international laboratories of the highest reputation should be provided. A greater awareness of opportunities for study abroad is needed. Additional support to send students and faculty to international meetings is also important.

Employment

We found that almost all of the students intend to remain within the university system. Internationally fewer than 10% of Ph.D. students take academic jobs after graduation. It is essential that alternative employment become available in the chemical industry or government research institutes in Brazil and that students be encouraged to consider these alternatives. Some strategies used in other countries include industrial postdoctoral positions, incentives for graduates or professors to start up small companies, or incentives for multinational corporations to invest within Brazil.

2º grupo

Consultores
Jean-Yves Bottero, Cerege–UMR–CNRS, França
Armin de Meijere, Universidade Georg August, Alemanha

Programas
Química Analítica, USP/SC
Físico-Química, USP/SC
Química, UFSCar
Química Orgânica, USP

General Remarks

At all three universities visited, the responsible coordinators had prepared for the visit of the reviewers very well, and they had perfectly organized the review process. At all institutions, the visits commenced with a general briefing, succeeded with a discussion with the faculty members engaged in the respective programs, lively discussions with a representative or even large group of students and included visits to research laboratories, instrumentation rooms and library facilities.

At all three institutions, the reviewers encountered a group of highly motivated and engaged faculty members with an incentive to do innovative research and publish the results in well reputed international journals. The discussions with students in general turned out that they were convinced to have chosen the right area of research and right place to carry it out.

The limited availability of appropriately funded scholarships, especially the lack of funds for consumables within certain scholarships, was frequently regretted. A ubiquitous complaint concerned the bureaucracy involved in the import of laboratory chemicals essential for everyday research, leading to unbearable delays of up to six months.

It was also commented on a negative note that CAPES too strictly relates scholarships to the time spent in the respective graduate program.

The reviewers feel that the scientific interactions between different groups of each institution could be enhanced and this could lead to an increased output of top-rated scientific results.

Specific comments concerning the four programs at the three visited institutions follow:

University of São Paulo at São Carlos

Since 29 out of a total of 41 faculty members engaged in the two graduate programs are the same persons, both programs were presented and discussed in one. A significant fraction of the faculty members have true leadership within their institution and an international standing in their research areas. On a positive note it is to be commented that in certain areas (especially chromatography, electrochemistry, photochemistry, physical organic chemistry) several faculty members are engaged as collaborating groups enhancing the efficient use of specific instrumentation and the scientific output accordingly.

Although the emphasis is put on basic research aspects, a significant number of publications is in applied areas. The per capita production of scientific papers is at the top level (1.5/year) in the state of São Paulo and thus in the whole country. The strongest groups publish their results in top-rated fully refereed international journals.

Many groups not only have collaborations within Brazil, but also active scientific contacts with an impressive number of institutions in Belgium, Canada, France, Germany, Italy, the United Kingdom, and the United States. These contacts are particularly valuable for the exchange of graduate students, especially at the Ph. D. level supported by Fapesp fellowships for up to six months abroad. Several laboratories (e. g. the chromatography group) are also regularly receiving visiting teachers and researchers. A significant number of grants for international collaborative research has been received and is still being received.

Altogether the reviewers counted more than 20 recent international collaborations, and the impression is that a predominant fraction of the faculty members have such international contacts.

The two assessed programs undoubtedly have reached a level that is competitive with that of well known institutions abroad.

The student perception of the qualification of the professors, the infrastructure, the interaction with and support by the faculty members, the relations with other universities in the country and with foreign researchers, is virtually identical with that of the faculty members. The degree of satisfaction with the current situation except for certain points (see above) is remarkably high.

According to the students' opinions, São Carlos has a very good reputation for its scientific output as publicized by regular newspaper reports.

Federal University of São Carlos

Although the scientific output published in international journals is not quite as high as that of IQ/USP-SP, a significant number of publications from this institution is competitive with international standards.

While the infrastructure as far as modern instrumentation and laboratory installation and equipment is of high quality and at a satisfactory level, the library situation needs to be

improved. It is at least fortunate that the other institution in the same city (IQ/USP-SC) has a proper library, and the electronic access to periodicals sooner or later - at the moment access is only available to those from a single publishing house - will help to remedy the situation.

The scientific orientation is towards basic research, e. g. there are two strong groups engaged in natural products chemistry and organic synthesis, there is also particular strength in the field of ceramics with a significant aspect towards applications.

The graduate program of this institution covers the whole range of Physical, Inorganic, Analytical and Organic Chemistry and a small part of the program is involved in Environmental problems, offering the students an adequate choice of research subjects, albeit that a few of the offered areas have not yet reached the critical mass to be competitive with institutions abroad. Though the majority of the faculty members are rather young and thus have a perspective for the future, some of them should be encouraged to seek collaborations within the institution, as well as in other institutions in the country and abroad. The established and strongest groups undoubtedly have an international standing and reputation.

The students have a positive overall perception of their situation at this institution. A significant fraction was attracted by Summer and Winter Schools offered at this university. It was stressed that financial support by a Fapesp scholarship comes with a fraction expendable for participating in conferences within the country and even for stays abroad.

University of São Paulo at São Paulo

The organic chemistry program at this university undoubtedly is the strongest in the country. The per capita output of scientific publications (2.6/year average in the last five years, and 4/year in 1999) is the highest in the country. The faculty members in this program have the highest number of publications in the very top international journals. There has been a major change in the age structure with two senior faculty having retired recently, and a significant initiative of hiring young faculty members which is still going on. This has also led to an actualization of the research projects which has made several of them more competitive with those being pursued abroad. The infrastructure has been drastically improved in recent years as far as laboratory installations and major instrumentation is concerned. It is now at a very high level comparable to that at prime institutions of higher education in other countries. The institution attracts more students into their graduate programs, and particularly the reviewed one, from other states than any other institution in the country, although this fraction is decreasing due to the increased availability of graduate education programs at other places.

The Institute of Chemistry at USP has an active exchange program with institutions abroad, which leads to regular sandwich projects for USP graduate students especially those engaged in Organic Synthesis, and to attracting foreign visiting scholars to present seminars in São Paulo. The faculty members are all engaged in the graduate program. They carry a definite role of leadership in the institution as well as other institutions around the country. Most of them have an international reputation not only through their publications but also through personal contacts with scientists abroad. In fact, a major fraction of the faculty has spent some time abroad. They also regularly engage themselves in the organization of international conferences.

The major fundings of this institution comes from the State of São Paulo. The import of equipment for this institution by far exceeds that of the other two institutions visited by the reviewers.

The output of Master’s and Ph. D. degrees from this program is the largest of any chemistry graduate program. The quality of the thesis projects is at an international level.

The students' opinion about their situation is in remarkable agreement with that of their research advisors. However, the students feel that the requirements for a Master's thesis would need an appropriate adjustment and should be different from those for a Ph. D. degree. Yet, most students are reluctant to enter the Ph. D. program directly, as they feel unsafe to choose the wrong subject.

It is a general concern that there are not enough interesting and attractive jobs for Chemistry graduates in Brazilian industry.

General Recommendations

In order to maintain or even improve the very high level of research and graduate education in the four programs at the three visited institutions, the reviewers would like to make the following recommendations:

1) Positions for technicians who can maintain the major instrumentation, should be provided to a greater extent, as sophisticated equipment is becoming ever more important for highly competitive research.

2) The access to international publications in periodicals other than those from the single publishing house and to databases (as e. g. Beilstein CrossFire) should be improved.

3) The import of reagents and laboratory chemicals need to be facilitated by removing the bureaucracy involved.

4) The research projects for a Master's degrees should be adjusted to a significantly shorter timeframe compared to that for a Ph. D. degree.

5) The availability of scholarships that permit students to spend up to one year in a well reputated laboratory abroad should be enhanced.

6) Collaborations within the same institution should be encouraged and potentially initiated by joint research grants that would be specifically allocated to collaborative projects especially for research groups that have not yet reached a critical mass.

3º grupo

Consultores

Juan Luis Gautier Zamora, Universidade de Santiago do Chile
Anatole Yatsimirsky, Universidade Nacional Autônoma do México

Programas

Química, UFSC
Química, UFSM

Federal University of Santa Catarina - UFSC

We visited the Centro de Ciências Físicas e Matemáticas of UFSC on March 28, 2000. We have the opportunity to talk with the University President, academic staff and graduate students, as well as visit the research laboratories and library. The visit started from an overview given by

Prof. Eduardo Humeres followed with an open discussion with the faculty and than with students.

At present time the academic staff consists of 29 full-time professors, 10 collaborator professors and 16 extra-mural professors. In this academic year they have total number of graduate students 131 from which 50 are M.Sc. students and 81 are Ph.D. students. It is important to mention that the number of students is constantly growing and, in particular, considering last 10-year interval it has increased by factor of 2.6. In the same period of time the number of faculty increased by factor of 1.8. Therefore, the number of students per professor shows a good growing tendency being increased from 2 to 4.5 (taking onto account the full-time professors only). It is interesting that the number of M.Sc. students remained practically constant while the number of Ph.D. students was growing rapidly.

The research conducted in the Centro de Ciências Físicas e Matemáticas of UFSC involves practically all areas of modern chemistry. In particular, there are important contributions in such areas as colloid and surfactant chemistry, bioinorganic chemistry, environmental analytical and pharmaceutical chemistry where the contributions from UFSC scientists are certainly at the internationally recognized level. We find it important that the faculty is actively collaborating both inside and outside of the Chemistry Department. This involves collaborating programs between groups working in pharmaceutical chemistry, physics, chemical and material engineering. There are also collaborative programs with industries of the South Region.

The scientific production in last three years (1997-99) consisted of 64, 97 and 83 papers in indexed journal and 217, 215 and 233 abstracts in National and International meetings respectively. Thus, the mean productivity is 2.12 papers per year per professor (taking into account full-time and collaborator professors). The quality of publication is reasonably high in terms of international standards. This is reflected also in relatively high number of citations of publications from the Department of Chemistry: the total number of citations is 2,826, which ranks the Department as 6-th among the Brazilian Universities. Four members of the Academic staff (Faruk Nome, Rosendo Yunes, Adilson Curtius and Hugo Gallardo) are among 120 most cited Brazilian chemists. In our opinion there is a sufficient number of faculty members with recognized leadership both at national and international level.

We had the opportunity to look through ca. 10 Ph.D. and MSc thesis and in our opinion they are prepared carefully, are dedicated to actively developed areas in chemistry and the main material of thesis has been published in the indexed international journals. The mean time of Ph.D. study till graduation is about 5 years, which is quite normal. There is no doubt that thesis quality in this university meets high international standards.

It is important that students have direct access to modern experimental equipment which involves such expensive and powerful instruments as 200 MHz NMR spectrometer, X-Ray diffractometer, thermal analyzer, differential scanning calorimeter, HPLC, TMA thermal analyzer, FT-IR, Mass-spectrometer, etc. In addition each research group possesses all necessary routine equipment.

There is a joint library for the whole Centro de Ciências Físicas e Matemáticas, where the chemical literature is presented by 79 journal titles, involving most important special journals. There is access to CD-ROM databases such as Chemical Abstracts, Current Contents, etc. However, some journal collections are not complete, especially in last three years. Importantly, students have free access to Internet and related information sources.

The faculty at Chemistry Department have been successful in obtaining funding from governmental organization in Brazil (CAPES and CNPq). This has allowed them to get very good experimental equipment, mentioned above.

The academic stuff is rather active in international collaboration. They have active collaboration programs with many well known foreign institutions such as Mainz and Darmstadt

Universities in Germany, CNR Research Center in Italy, University College in London, New Jersey University in USA, etc. It is important to mention that students also participate in the exchange program and have good opportunities to carry out parts of their thesis research in highly professional environment of guest laboratories.

We were much impressed by students during our conversation with them for ca. 20 minutes because all seemed to be highly motivated. As a generalization we found the graduate students to have a competent understanding of their particular research project. They are very happy with the level of their professors and thesis works. Only major concern to the time NMR access and the time consuming to order chemicals.

Conclusions

In terms of the fundamental research, the quality of the work at Centro de Ciências Físicas e Matemáticas is very good and is at the level of high international standards. However the industrial interactions must be emphasized. It seems that the area of Environmental and Oceanographic Chemistry, that is perhaps one the youngest at Chemistry Department, is a step in the correct direction and could be enforced.

Federal University of Santa Maria - UFSM

We visited the Centro de Ciências Naturais e Exatas of UFSM on March 29, 2000. We have the opportunity to talk with the academic staff and graduate students, as well as visit the research laboratories and library. The visit started from an overview given by Prof. Nilo Zanatta followed with an open discussion with the faculty and than with students.

At present time the academic staff consists of 14 full-time professors. In this academic year they have total number of graduate students 77 from which 25 are M.Sc. students and 52 are Ph.D. students. The number of students is constantly growing and, in particular, in last four years it nearly doubled. The number of students per professor is 5.6. This is substantially higher number than those for such universities as UFRGS, UFSC and UFSCar (2.6, 4.2 and 4.8 respectively).

The research conducted in the Centro de Ciências Naturais e Exatas of UFSM is restricted mainly with traditional areas of chemistry. There are important contributions in such areas as synthesis of heterocyclic compounds, inorganic and organometallic synthesis, study of natural compounds and analytical, in particular, environmental, chemistry where the contributions from UFSM scientists reach the internationally recognized level. The faculty is actively collaborating both with academic and industrial institutions.

The scientific production in last three years (1997-99) consisted of 22, 34 and 43 papers in indexed journal and 42, 39 and 39 abstracts in national and international meetings respectively. Thus, the mean productivity is 2.35 papers per year per professor. The quality of publication is reasonably high in terms of international standards. Since the Department is relatively new the use of Citation Index seems irrelevant in this case.

We had the opportunity to look through ca. 10 Ph.D. and M.Sc. thesis and in our opinion they are prepared carefully, are dedicated to actively developed areas in chemistry and the main material of thesis has been published in the indexed international journals. The mean time of Ph.D. study till graduation is about 4.5 years, which is quite normal. We consider the thesis quality in this university to meet international standards.

It is important that students have direct access to modern experimental equipment which involves such expensive and powerful instruments as 200 and 400 MHz NMR spectrometers, X-Ray diffractometers for monocrystals and powder, HPLC, elemental analyzer, FT-IR, etc. In addition each research group possesses all necessary routine equipment.

There is a central library for the whole University, where the chemical literature is presented about 20 journal titles, involving most important special journals. There is access to CD-ROM databases such as Chemical Abstracts, Current Contents, etc. However, journal collections are not complete, especially in last three years. The faculty are doing their best to have access to current chemical literature via personal subscription, but it is clearly necessary to find out more support for subscriptions. Importantly, students have free access to Internet, but should pay a (small) fee for the use of Chemical Abstract on CD.

The faculty at Chemistry Department have been successful in obtaining funding from governmental organization in Brazil (CAPES and CNPq) and especially from the industry. In particular, they have important funds from Tobacco Industries (US$350,000.00) for pesticide analysis, and from Defensa Co. and Fapergs (US$49,000.00) for different kind of analysis. This has allowed them to get very good experimental equipment, mentioned above.

The academic staff is rather active in international collaboration. They have active collaboration programs with many well known foreign institutions such as Hamburg, Tuebingen, Geissen, Bonn and Munich Universities in Germany, Buenos Aires, Cordoba and La Plata Universities in Argentina, etc. Inside Brazil there are collaboration programs with universities of Rio Grande, Santa Catarina, San Carlos. Collaboration with industry involves Volkswagen, Basf, Riocel, Defensa, Friso Companies. It is important to mention that students also participate in the exchange program and have good opportunities to carry out parts of their thesis research in highly professional environment of guest laboratories.

We were much impressed by students during our conversation with them for ca. 60 minutes. They are highly motivated and are dedicated to serious research work. As a generalization we found the graduate students to have a competent understanding of their particular research projects. However, there are also some serious problems, which trouble the students.

First of all, there is a permanent delay in deposit of their CAPES fellowships (at the same time the fellowships from CNPq are deposited in time). We understand that this is a local problem related to the way in which the university distribute the CAPES funds, but we urge CAPES to investigate the situation and find a solution as soon as possible because these delays cause serious financial problems for students (they often cannot pay housing rent and utilities in time and therefore must finally pay substantial fines).

Second, the students say that very high inscription fees at international conferences held in Brazil make virtually impossible for them any participation in these important scientific events. Would be very much desirable if governmental organizations or professional societies in Brazil would provide a special support for students. Evidently, student participation in such events would considerably improve their general knowledge in the areas of their researches.

Conclusions

In terms of the fundamental research, the quality of the work at Centro de Ciências Naturais e Exatas of UFSM is very good and generally meets the international standards. Of course, one should take into account that the Chemistry Department is very young, however it already has important scientific. We have a clear impression that this institution has very good perspectives for future scientific growth and achievements.

Final Remarks

In terms of global structure, all programs must have access to actualized libraries and research infrastructure that makes possible the high level development. A general problem that exists is related with the institutional financial support. Problems with the debit balance (support approved by several sources such as PADCT/CAPES, PADCT / CNPq and Finep/BID and others) will relent the progress on the program¢s infrastructure, scientific exchanges (students and researchers) and relevant scientific production demonstrated just to present.

We were very much surprised to learn that the acquisition of chemicals for laboratory work from chemical companies is an extremely complicated and expensive procedure in Brazil universities. First of all, there is absolutely unnecessary in this case bid procedure. Chemical reagents are not very much expensive and there is a complicated balance between prices and reagent quality, understandable for the researchers but not for non-specialists. In addition, the bid procedure strongly delays the delivery of the reagents. Other problem is the participation of intermediate dealers, which takes their commissions. As a result, the Brazilian researcher must pay for the reagent 5 to 10 times more that the catalogue price and in addition to wait more than 3 months for the delivery. We strongly recommend solving this problem.

Resumos traduzidos, por grupo de consultores

1º grupo:

Profs. K. Hafner & D. Stynes

- **Observações gerais sobre os programas de Química (UFPE, UFRJ e UFMG)** – cada programa forneceu estatísticas detalhadas, que se somaram a visita de instalações, exame de algumas teses e discussões com alunos (só três na UFRJ). O treinamento de alunos é bem planejado e os exames de padrão internacional. Há evidências de cooperação entre grupos, especialmente na UFPE (lantanídeos luminescentes) e UFMG. Os alunos têm em geral muito boa qualidade, muitos capazes de relevante contribuição individual; alguns completaram o doutorado-sanduíche no exterior. São em geral comparáveis aos dos EUA e da UE, dedicam cerca de 50 h/semana ao programa e a maioria pretende trabalhar depois em universidades (ver comentário a frente). A qualidade docente é alta, todos doutores, e metade possui experiência no exterior. Muitos cooperam com grupos norte-americanos e europeus, o que é importante para manutenção de seu padrão internacional e promoção da pesquisa brasileira. Segundo os alunos, a orientação é adequada e acessível. Os temas das teses são por vezes locais (UFMG – restauração química de peças de arte), mas a maioria se atém a problemas fundamentais e de padrão internacional. A produção é razoável sob uma ótica internacional, considerando seu número e a escassez de recursos e bolsas de pós-doutorado. O padrão geral é muita publicação, de alguns docentes em jornais de alto impacto, enquanto outros preferem periódicos menos conhecidos; isso está contudo mudando com o ingresso de pessoal novo (em especial os com experiência no exterior), que visam veículos de topo. A infra-estrutura é variável: na UFPE há falta de equipamento necessário a um programa que abrangia todas as subáreas; há menções sobre projetos não realizados, por essa limitação. A Química Computacional é bem desenvolvida nas três IES e dispõe de aparato adequado. As bibliotecas da UFPE e UFMG possuem coleções de periódicos de 1ª linha, descontinuadas por irregularidades de fundos; o número de livros e teses é inferior ao padrão internacional. O sistema de comutação da UFPE funciona bem, e as outras instituições estão bem conectadas à Internet. O problema da demora na importação de reagentes foi mencionado. Os consultores concordam com a avaliação prévia da CAPES e com os critérios de padrão internacional adotados.

- **UFPE**: o programa titulou o primeiro doutor em 1996, o que evoluiu para sete em 1999. O programa baseia-se em intercooperação de grupos de subáreas da Química, e também da Física e Biologia; essa "colegialidade" é até uma vantagem para o programa e é bem vista pelos alunos. Uma desvantagem é que estes dispõem de poucas áreas para escolha no programa; este atua como centro regional e atrai alunos de todo o Nordeste. A qualidade do corpo docente é alta, contudo heterogênea; dos 23 permanentes, 2 pertencem a Academia de Ciências, e os seniores respondem pela melhor produção e reputação internacional. O programa seria muito beneficiado por uma melhor infra-estrutura, o que será em parte obtido com a construção de novo edifício. A nota 6 é adequada; a solidez e desenvolvimento do corpo docente compensa as deficiências de infra-estrutura, que devem ser corrigidas.

- **UFRJ**: esta avaliação difere por ser este o único programa de Química Orgânica, que possui três subáreas: a Básica (Síntese, Produtos Naturais e Modelagem Molecular, que se complementam muito bem), Analítica (teste de drogas e *dopings*) e Aplicada (Geoq., Polímeros e Cerâmicas, resíduos e Catálise). Pontos fortes: RMN e modelagem molecular. A relação de algumas áreas aplicadas (Xistoquímica, com laboratório antiquado) com o programa não é muito clara. A nota 6 é adequada; seria recomendável maior integração de todo o departamento de Química, que é relativamente bem equipado.

- **UFMG**: a melhor apresentação de todos: os *dossiers* sobre todas as subáreas da química eram concisos e muito informativos; dados sobre disciplinas, publicações, seminários e cooperações foram também fornecidos. O contato com os alunos foi estimulante, e estes trabalhavam nos laboratórios quando da visita. O amplo espectro de áreas abrangidas permite uma excelente formação. Há cooperação com indústrias, donde provêm recursos para pesquisas e bolsas. Os instrumentos são excelentes; a RMN tem dois técnicos e presta serviços fora da IES, o mesmo ocorre com outros serviços analíticos, e deve-se dizer que o suporte técnico é superior ao padrão internacional. Considera-se o programa com nota 7; é bem equipado e organizado, abrange muitas áreas com excelência e possui muita cooperação industrial e internacional.

- **Recomendações**: 1– o tempo de titulação é alto, onerando a IES e o aluno; deve-se selecionar os melhores alunos para ingresso direto ao doutorado e/ou passá-los do mestrado sem exigir dissertação, um período de 5 anos entre o bacharelado e o doutoramento é razoável; 2 – maior apoio a treinamentos e eventos no exterior para os alunos; 3- o padrão internacional é que menos de 10% dos titulados trabalhem em universidades. O Brasil deve encontrar alternativas para os egressos em indústrias ou centros de pesquisa, incentivos para empreendimentos etc.

2º grupo:

Profs. A. Meijere e J.-Y. Bottero

- **Observações gerais** – (Físico-Química e Q. Analítica – USP/SC; Química – UFSCar; Q. Orgânica – USP): todas as visitas foram muito bem elaboradas pelos programas e começavam por uma apresentação geral, seguida por discussão com docentes, alunos e revista aos laboratórios e bibliotecas. O corpo docente é sempre altamente motivado, e os membros realizam pesquisa inovadora e a publicam em bons jornais internacionais. Quanto aos alunos, observa-se em geral sua satisfação com a área e programa escolhidos. Foi abordada a insuficiência de recursos para bolsas e materiais de consumo, bem como a burocracia para importação destes, resultando em atrasos de até seis meses. Houve reclamações de que a CAPES relaciona muito estritamente as bolsas ao tempo dedicado ao programa. O aumento da interação entre os grupos em cada instituição pode resultar em maior número e qualidade de produção científica.

· **Observações sobre a USP/SC**: do total de 41 docentes nos dois programas, 29 são compartilhados entre os mesmos, por isso serão discutidos como um todo. Parte significativa dos docentes possuem liderança em sua IES e padrão internacional em sua área; há cooperação na pesquisa e no uso de aparatos e entre algumas áreas (cromatografia, eletroquímica etc.). A pesquisa básica é enfatizada, mas há também muitas publicações na área aplicada; a produção *per capita* de 1,5 artigo/ano é a maior do país, e os grupos mais fortes publicam nos melhores periódicos. Muitos grupos têm cooperação nacional e com várias instituições nos EUA, no Canadá e na UE; contatos especialmente úteis para o intercâmbios de alunos (doutorado-sanduíche da Fapesp) e visitas de estrangeiros; têm sido concedidas muitas bolsas para essa cooperação internacional. O grau de satisfação de docentes e alunos é excelente, e eles atribuem a reputação de seu programa à produtividade científica. Os programas atingiram um patamar competitivo com as instituições renomadas no exterior.

· **UFSCar**: embora a produção científica não seja tão alta quanto à da USP, parte significativa é competitiva internacionalmente. Enquanto a infra-estrutura e os equipamentos são de alta qualidade, a biblioteca precisa ser melhorada – por outro lado, a boa biblioteca da USP/SC reduz o problema como o acesso eletrônico (atualmente a só uma editora). A ênfase é em pesquisa básica (síntese de produtos naturais), mas há também aplicações para cerâmicas. O programa cobre praticamente todas as áreas da química e uma parte está envolvida com ambiência, permitindo opções pelos alunos, embora algumas poucas áreas não tenham ainda alcançado padrão internacional. Docentes mais jovens e com potencial devem buscar cooperação na própria IES e externas; os grupos mais fortes gozam de indubitável reputação internacional. Os estudantes têm uma percepção positiva de sua situação, e deve-se ressaltar que o suporte da Fapesp também inclui apoio a viagens para eventos e congressos, mesmo no exterior.

· **USP**: o programa de Química Orgânica é certamente o mais forte do país. A produção média anual por docente é de 2,6 artigos nos últimos 5 anos e de 4 em 1999, a maior do Brasil; possui ainda o maior número de publicações em *journals* de topo. Houve alterações no quadro docente (2 aposentadorias e atual contratação de jovens), o que atualizou os projetos e tornou-os mais competitivos internacionalmente. A infra-estrutura de laboratórios foi drasticamente melhorada em anos recentes e é hoje comparada a de programas internacionais de 1ª linha. O programa é o que atrai o maior número de alunos (também de outros estados) no país, que vem contudo decrescendo devido ao crescimento do número de outros programas. Possui forte intercâmbio com o exterior, atraindo professores visitantes e atividade regular de projetos de doutorado sanduíche (com destaque para Síntese Orgânica). Os docentes desempenham liderança nacional e no exterior, onde passam parte do tempo, e organizam freqüentemente conferências internacionais. A maioria dos fundos provêm da Fapesp e a importação de equipamentos excede em muito àquela dos demais programas visitados. A titulação de mestres e doutores é também a maior, e a qualidade das teses segue o padrão internacional. A opinião dos alunos sobre sua situação coincide com a dos docentes, contudo aqueles sentem que os requerimentos para o mestrado deviam ser diferentes daqueles para o doutorado; alguns sentem-se inseguros para o ingresso direto no doutorado, por não saberem escolher bem a subárea. Todos concordam em que não há interesse suficiente das indústrias em contratar os egressos.

· **Recomendações gerais**: para manter e melhorar o alto nível de pesquisa e educação alcançado:

1 – devem ser mantidas posições para técnicos de manutenção, por causa da sofisticação crescente dos equipamentos;

2 – o acesso às publicações internacionais e bancos de dados deve ser melhorado;

3 – a burocracia para importação de equipamentos e reagentes deve ser removida;

4 – os projetos de mestrado devem ser reajustados para um prazo menor;

5 – deve ser incrementado o programa de doutorado-sanduíche;

6 – cooperações na própria IES devem ser encorajadas e visar os grupos que ainda não atingiram massa crítica.

3º grupo:

Profs. J.L. Gautier e A. K. Yatsimirsky

· **Química - UFSC** – a visita consistiu de entrevista com o Reitor, docentes, alunos e inspeção de laboratórios. Com 29 docentes permanentes, 50 alunos de M.S. e 81 de D.S., o programa cresceu muito nos últimos 10 anos, especialmente no número de doutorandos. A pesquisa abrange todas as áreas da química moderna e é de padrão internacional nas subáreas de colóides e superfícies, bioinorgânica, análise ambiental e farmacêutica. A cooperação é ativa internamente e com grupos de física, materiais etc., e com indústrias da região. A produção de artigos é $2.12.\text{docente}^{-1}.\text{ano}^{-1}$ e de padrão internacional, contando-se 2.826 citações, com 4 membros entre os mais citados dentre os pares brasileiros. As teses são de boa qualidade internacional e em áreas ativas, e geram artigos em periódicos de 1ª linha. Os equipamentos são modernos e caros e de acesso direto aos alunos; a biblioteca conjunta possui 79 periódicos na área, bancos de dados em CD e Internet, embora haja falhas nas coleções, em especial nos últimos 3 anos. O apoio financeiro das agências tem sido efetivo. Há convênios importantes com instituições renomadas dos EUA e da UE, e os estudantes participam dos intercâmbios. Os alunos são altamente motivados, satisfeitos com o curso e competentes em suas áreas, a única queixa é a demora na importação de reagentes. O programa é de alto nível internacional; contudo, as interações industriais devem ser reforçadas, bem como a nova subárea de Química Ambiental e Oceânica.

· **Química – UFSM**: a avaliação consistiu de entrevista com docentes e alunos e visita às instalações e à biblioteca. O programa possui 14 docentes permanentes e 77 alunos (dobrou nos últimos 4 anos), dos quais 52 são de doutorado; a taxa aluno/professor é mais alta que a da UFRGS, da UFSC e da UFSCar. A pesquisa é restrita à química tradicional, e há importantes contribuições nas áreas de síntese de heterocíclicos, inorgânicos e organometálicos, e análise de compostos naturais e ambiente, esta de padrão internacional. O corpo docente coopera com instituições acadêmicas e industriais. A produção anual por docente é de 2,35 *papers* de qualidade razoável em termos internacionais, assim como as teses, que em geral versam sobre áreas bem desenvolvidas. O tempo médio de doutoramento (4,5 anos) é adequado. Os equipamentos são modernos e caros, e de acesso direto aos alunos; a biblioteca central possui 20 periódicos na área, bancos de dados em CD e Internet (há uma taxa de uso), embora haja falhas nas coleções, principalmente nos últimos 3 anos; o esforço pessoal dos docentes pode ser apenas um paliativo. O apoio financeiro das agências do governo é efetivo e deve-se destacar o suporte de indústrias de fumo, agrodefensivos e da Fapergs, que possibilitou o equipamento supracitado. Há convênios importantes com instituições renomadas dos EUA, da UE, América do Sul e das IES brasileiras, e os estudantes participam dos intercâmbios. Os alunos, motivados e competentes, enfrentam no entanto atraso das bolsas da Capes (mas não do CNPq): isso pode ser causado pela IES, mas cabe à CAPES resolver o problema. Além disso, queixam-se do alto custo de participação em eventos internacionais no Brasil. Em termos de pesquisa fundamental, o trabalho atende o padrão internacional, e deve-se considerar o fato de ser um programa jovem, que contudo já alcançou importância e apresenta boas perspectivas.

Observações finais:

Parece haver dificuldades de financiamento oficial. É surpreendente a dificuldade de importação de reagentes, processo que prescinde de levantamentos de preços, por causa da delicada relação preço/qualidade. A presença de intermediários brasileiros duplica os preços e a burocracia atrasa as entregas. Recomenda-se fortemente a resolução deste problema.

Avaliação Internacional da Pós-graduação

Ciências Agrárias

Na semana de 11 a 15 de setembro de 2000, a CAPES realizou a avaliação internacional da pós-graduação em Ciências Agrárias, visitando os seis programas da Universidade Federal de Viçosa que receberam nota 6 ou 7 na Avaliação de 1998. Publicam-se abaixo os relatórios finais das visitas e seu resumo traduzido.

GRUPO

Consultores
Paul Gepts, Universidade da California/Davis, EUA
Lawrence Morris, Universidade da Geórgia, EUA
Kevin Wade, Universidade McGill, Canadá

Programas
Fitotecnia
Fitopatologia
Solos e Nutrição de Plantas
Genética e Melhoramento
Ciência Florestal
Zootecnia

Introduction

The review committee evaluated programs in Animal Science, Crop Science, Forest Science, Genetics and Breeding, Plant Pathology, and Soil Science. Faculty and student participation in the review was excellent. Each of the two-hour evaluations was well organized and provided an effective overview of the programs. Discussions were open and candid: indicative of a faculty that shares a common vision and a strong sense of commitment. We appreciate the quality of the preparation and the time we spent with each program.

To achieve and maintain excellence in the agricultural programs we evaluated requires:

- a well-trained faculty engaged in both basic research and applied research;
- immediate access to recent research findings published worldwide through traditional and electronic library resources;
- publication of research results in quality international journals, participation in national and international organizations and collaboration with researchers from leading institutions from throughout the world;

- adequate facilities including appropriate space, modern analytical equipment, quality greenhouse and field research facilities and ready access to state-of-the-art computing with necessary software;
- quality graduate students that interact closely with faculty and participate fully in research programs.

We begin the report by providing comments on our visit and a general assessment of the programs. We then address each of these five points as they relate to the overall quality of programs. We conclude with specific comments on individual programs we visited.

General assessment

The Universidade Federal de Viçosa (UFV) is one of the premier institutions of higher learning for agriculture in Brasil, based on its more than 70-years old tradition and excellence of its programs. Its impact is felt primarily in Brasil and to a lesser extent abroad. Within Brasil, UFV has had a major impact not only in Minas Gerais but also across the borders of the state. From our contacts during our visit, it is clear that major assets of this institution are its faculty and its students.

The students displayed a great interest in our visit. In our limited time with them, we found them to be dedicated to learning, enthusiastic and highly interactive. Overall, they were highly supportive and proud of their respective graduate programs.

The programs we visited have managed to maintain an excellent balance between classical and more modern approaches. We hope that the faculty will be given the opportunity to maintain this balance. Classical approaches are, in many cases, more appropriate, given the state of development of agricultural resources and the large area of the country. More modern methods may provide advances in the longer term.

Funding for the programs is generally good but, for most programs, is highly dependent on state and federal government funding. A long-term goal of all programs should be to develop a better balance between public and private research funding. A specific concern of the committee relates to the length of time between approval of government proposals and the time that funds are received. Delays in receipt of funds make it difficult to plan ahead and maintain smooth functioning of research programs. We encourage efforts to improve the efficiency of the funding process. Increased funding from the private sector will require development of formal policies for intellectual property and assistance to faculty in implementing these policies at UFV. The committee notes that the institution has already initiated the development of such policies.

Quality of the faculty and research programs

The faculty is dedicated and motivated. It is well-trained and shows a desire to further its education, often abroad. It is highly committed to graduate education. The average number of graduate students per faculty is high. Students uniformly commented that they have easy access to their major professors or committee members for advice. The faculty is also very productive when taking into account all their responsibilities. They generally have a high teaching load compared to faculty in similar North-American institutions. Furthermore, many faculty have taken on a leadership role in Brazilian science as officers of professional societies and editors of journals.

Access to research results through library resources

The library is housed in a modern building and has extensive collections of books and periodicals, including international ones. We found these collections to be quite complete as they included materials from all areas of agriculture and covered basic as well as applied areas (with the *proviso* noted below). The library is also transferring its catalogue into an electronic format and is developing capabilities for distance education.

Concerns were expressed repeatedly by both faculty and students about recent interruptions in subscriptions to journals, due to sudden reductions in funding from federal sources. UFV has made a noteworthy effort to make up for the lost funding. However, bureaucratic procedures have, so far, apparently prevented the timely availability of the most recent issues.

We would also suggest that electronic subscriptions to journals (via the internet) be initiated, perhaps in partnership with other universities.

Publication in international journals and participation in international activities

On the subject of international activities, the committee felt that the programs (some more than others) could take greater advantage of the available resources. While the committee is aware of (and agrees with) the need to publish local results for the local community – both in terms of scientific as well as popular-press articles – there is also a strong desire that innovative research be made available to the scientific community at large. In most cases, there was no question as to the quality of the work being carried out.

There remains, however, a sense of loss associated with the researchers not receiving the credit they deserve in all of the international community. The argument that much of the research is funded by state and federal authorities and should, therefore, be reported only in Brazilian outlets is not convincing: publication of ideas that add to the body of knowledge and are circulated abroad bring returns, not only the researchers and university involved, but also to the agencies that had the vision to fund them. The results of such publications are many, leading to a higher reputation for the team and the institution, increased international collaboration, more applications of the resulting basic research on a world-wide scale, possible positions for graduate students (or, at the very least, chances to take one of the three degrees elsewhere), and the increased likelihood that of welcoming visiting scholars to Brasil. This last point is a subtle one in that there is abundant evidence that the faculty go abroad for sabbatical leaves.

Given the quality of the research being carried out in the labs and research teams, there should be a significant amount of reciprocal visits as well – visits that would become more numerous if the researchers were better known abroad. It should be emphasized that the committee is in no way criticizing any seeming lack of international publications but rather urging the programs to seize their just recognition in the international community. Nor is the committee suggesting that current outlets cease: there is a need to share basic research with the Brazilian community, and specific applications, of relevance to local industry, must be made available as well. A balance, therefore, needs to be found among international and national scientific outlets, as well as local and specific popular-press articles.

The committee was not convinced of any “lack of spoken english” as a deterrent from initiating this process – in fact, it was greatly impressed with the number of people (students and staff) that spoke english well! The committee did, however, recognize the need for support in terms of translation services and, while the University of Viçosa is to be commended on its commitment to cost sharing with these costs, there was also a perceived need to encourage graduate students to publish worthwhile results internationally. Constructive criticism from

international reviewers is a healthy part of the education process and will help to build confidence for future submissions.

On a related note, the committee was very impressed with the "sandwich" program and would urge its maximum utilization. There may be a need to publicize its availability and the faculty might do well to make applications a standard part of their students' programs. It appeared that not all of the scholarships for this program are being used, and an increase in applications might lead CAPES to consider allocating more to each program. The obvious benefits from such an exchange include well-rounded students with another perspective of their areas, an improved command of a foreign language, the possibility of internationally published articles while collaborating with other institutions. These are abilities that add to a student's *curriculum vitae* while providing an excellent basis for future researchers with diversified views and abilities. It will also often result in establishing contacts for future degrees, post-doctoral fellowships and sabbatical exchanges.

The committee was encouraged by the availability and frequency with which sabbaticals could be taken by faculty. This exchange represents a time for personal renewal and their best opportunity to learn the most recent methods in their respective fields while interacting with colleagues from other institutions. It was noted that many faculty often return to the university from which they received a degree and the committee felt that, perhaps, other venues could also be explored. As with the case of the student exchange program, a sabbatical leave has enormous implications for increased international collaboration, shared publications and exchange of graduate students.

Facilities

In general, the facilities are adequate and well maintained. Offices and laboratories are of appropriate size and configuration. Greenhouse and field facilities are in close proximity and have the necessary support staff to organize their utilization and support research programs. Specific comments on facilities are discussed within each program area.

Quality of graduate students and training

The Committee was impressed with the high degree of participation at our meetings and the students' commitment to their programs. They are proud of their programs and have a good working relationship with the faculty. Access to faculty and to laboratories is excellent. Students graduating from the programs have been well trained and are competitive with students trained in strong programs in North America.

We would like to comment on several issues discussed during our meetings with graduate students. First, and most important, the committee believes that the CAPES program focus on the length of time students take to *complete* their programs is having undesirable effects. We recognize that prior to implementation of this program students were taking too long to complete both M. S. and D. S. degrees. The introduction of strict time limits on CAPES fellowships has resulted in significant reductions in the average time students are taking to complete their degrees. We are concerned that 24 months is too short a time to complete an M. S. degree. Students entering a M. S. program must complete more than a year of course work before they are prepared to begin work on their theses. Since many experiments in agronomic disciplines, particularly those involving field experimentation, require time for plants or animals to develop, there is insufficient time to complete many experiments, analyze data, write the thesis and prepare manuscripts in a two-year period. Our experience is that most M. S. programs require between 27 and 30 months to complete and that this should be reflected in evaluation of these programs. Even if CAPES funding is restricted to a two-year period, the program should not be

penalized for using other funds to allow students additional time to finish. Moreover, there will be increased opportunity to publish manuscripts in english or other languages if additional time were available to prepare manuscripts while in the program. In contrast to our concerns about the length of the M. S. program, we believe 48 months is adequate time to complete a D. S. program after completion of an M. S. degree. Our experience indicates that students entering directly into the doctoral program, after completing their B. S., will require 60 to 66 months to complete their theses.

Second, severe limitations in graduate student office space and access to computers exists in all programs. All of the programs we visited place high expectations on their students. Provision of a permanently assigned desk as well as ready access to a computer should be the norm. Many students work at home because of the limited number of computers available to them and the lack of adequate desk space. While some of this is to be expected in all graduate programs, priority should be given to providing each new student with a desk and increasing the availability of computers.

Third, the degree to which individual programs encourage and support publication of results in international journals and in english is variable. Although most students were aware that CAPES will fund 50% of the costs of translations and page charges for publication in english or other language journals, the additional cost of publishing in these journals remains a factor that discourages their use. As a consequence, much of the high quality research being conducted in graduate programs is not being published in widely-circulated international journals. The library has an excellent facility for language training, but use of this laboratory is limited to students enrolled in specific language courses and, consequently, requires an additional time commitment in an already full program. The students also indicated that the general language courses available do not provide the technical content they need. Improvement in general access to the language facility, as well as technical content of language courses, is needed. Many of the faculty have an excellent command of english and one way to improve student facility in spoken english, without requiring additional course work or time, would be to teach one or more of the required courses in english..

Fourth, opportunities for international travel for meetings are limited. Few students have traveled to present their results at international meetings outside of Brasil, and greater opportunities for this type of interaction is important. The “sandwich” program is an exceptional program and should be used as much as possible. Awareness of the program and encouragement to participate in the program appeared to vary among departments.

Finally, although students were most concerned about access to recent journal articles and computer access, some concern about the lack of increase in CAPES fellowships was expressed.
Evaluation of specific programs

Graduate Program in Animal Science

Animal Science was seen as a well-established program with representation in all of the necessary disciplines. It compares extremely favorably with its international equivalents in terms of breadth, diversity and areas of research, and has an excellent mix of young scientists (well-versed in the most recent methods of their field) and more experienced staff with the ability to provide leadership and advice.

The research facilities were found to be in good condition, well-equipped and close enough to the main building to encourage an appropriate mix of theoretical and applied studies in the various fields. The committee was impressed with the new cattle facilities and saw much potential for research areas, resulting from this installation. The department is to be commended for its initiative in attracting funds for this new building and its associated staff and

infrastructure. The biotechnology facilities were considered more than adequate and complementary to those of BioAgro.

There was impressive evidence that all of the areas, that one would expect to see in a program of international quality, were there. As with any department, there were some fields that had more staff than others but this is to be expected to be dictated by the needs of the region and the specific strengths of the indigenous species.

Approximately 40% of the faculty had received their training from a foreign university while an equivalent number had received all three of their degrees from UFV. Comments have already been made concerning the desirability of as much diversity as possible, and it was encouraging to see that many of the newer members are diversifying their degrees in terms of different institutions. There was also a good indication that the sabbatical system is being utilized, and certain faculty members were identified as having taken one recently or were scheduled to take one in the near future. This general tendency in the area of professional improvement and renewal (both in terms of degrees and sabbaticals) should be encouraged.

The publication rate for the department was noted as being extremely high – one of the highest in the university. It was also noted that there seemed to be a strong preference for publication in the *Brazilian Journal of Animal Science.* The committee has already commented on the value of publication in the most widely circulated journals but would like to emphasize this point in the case of Animal Science. There is no doubt in our mind that the research being performed is of high quality with much of it worthy of circulation at the international level. It seems, therefore, that the program would benefit enormously from publication of these results in other journals as well. This comment should, however, in no way be considered as a criticism of the quality of the program – simply a strong encouragement to share these findings with the *rest* of the scientific community.

As with large department anywhere, there is a tendency for groups to work somewhat in isolation (both in terms of students and fields within a program). It was, however, very encouraging to see that some of the faculty and students saw a real need for more cross-disciplinary collaboration. This is especially true in a discipline like Animal Science which is often considered a central component of an agricultural faculty. The list of inter-related departments was outstanding and efforts should be made to consolidate these links with other units both in terms of collaborative research and use of common facilities. The existence of BioAgro should also be considered as a complementary resource for cross-disciplinary work rather than just “another unit’s building”. The committee also noted the program’s national and international collaboration/exchanges and hopes that the department can continue and expand on these fine initiatives. The funding for research was significantly high with approximately 97% coming from government (state and federal) sources with the remainder from private resources. The latter may represent an area that could be exploited more in the future.

The committee was very impressed with the students it met and found them to be very content with and proud of their program. They were interested in having access to the most recent periodicals in their respective areas, and were open to the idea of publishing more in international journals. They felt that a good approach to the latter would be to ask their professors for suggestions in terms of appropriate outlets.

Overall, it was obvious that both the program and the resulting graduates are well respected in their fields and are performing at a quality that equals those with which the committee is familiar. The committee encourages the department to increase the scientific community’s awareness of its results and to continue with collaborative efforts within the university, with private industry sources and with the international community at large.

Graduate Program in Crop Science

The faculty of this group is large and of sufficient size to achieve a critical mass necessary to cover the different areas of crop science and major crops in the country. Their doctoral degrees were obtained in about equal numbers from international institutions and UFV and, to a lesser extent, from other national institutions, especially Esalq. As other Brazilian institutions become stronger, we would encourage increased reliance on them as a source of candidates for faculty positions to promote "cross-fertilization" of ideas and approaches. Some 60% of the faculty have been recognized with a CNPq fellowship. About 30% have obtained a postdoctoral fellowship. We note a number of faculty were appointed recently and, thus, there is a good mix of more senior and younger faculty.

The faculty plays a significant leadership role at the national level, for example by editing several journals, collaborating in projects with national institutions and maintaining germplasm collections. Its international role is more limited and consists primarily of advising international students from Latin America and participating in bilateral collaborations with U.S. institutions and one Japanese institution.

The research themes are comparable to those in crop science departments at foreign institutions. They comprise the full range of topics from applied to more basic studies and from field to laboratory studies. Productivity is very high as measured by publications (scientific journals, technical and extension publications). Of particular note are the crop varieties developed by the Crop Science department. Those of soybean appear to have a widespread impact both in Minas Gerais, the rest of Brasil, and neighboring countries. Those of beans have a major impact in the state. Recently, the department released a new coffee variety with resistance to rust, a major constraint of this important crop.

Funding for this research relies heavily on federal and state funds, with a more limited contribution from private enterprise. Of note, is the large number of student fellowships from CAPES and CNPq (more than 100), which covers most of the enrolled students.

The infrastructure is adequate. The department benefits from its involvement in the BioAgro (Instituto de Biotecnologia Aplicada à Agropecuária), where molecular marker and tissue culture research is conducted.

Our overall view is that this program is of international quality. It compares favorably with crop science programs in the Canada, Europe, and the USA, both in terms of quality and quantity of the research, teaching and extension productivity. We would encourage the faculty to take on more international responsibilities, particularly in Latin America (we noted only one collaboration with another South American country).

Graduate Program in Forest Science

This department contains 23 faculty which is comparable to a mid-sized forestry program in North America. All but one of the faculty hold a doctorate degree and there is a good balance between full professors and junior faculty. In general, there is good breadth within the faculty. Faculty expertise ranges from areas of seed physiology to primary wood processing. Faculty expertise in forest business and forest ecology was not strong but the committee recognizes that individual forestry schools will develop strengths in selected areas, and that these may be strengths of other forestry programs in Brasil.

More than 50% of the faculty (13 of the 23 faculty) received their doctorate degrees from institutions outside of Brasil. Eight faculty members received their D.S. from Viçosa and six of the eight faculty members received all three degrees from Viçosa. Of the eight faculty members that received their doctorate from Universidade Federal de Viçosa, three have worked or studied

abroad. While the overall diversity of training is good, faculty receiving all of their degrees or their final degree from Universidade Federal de Viçosa should be encouraged to spend a sabbatical abroad.

In general the facilities were excellent. Adequate laboratory and greenhouse space was available and laboratories were suitably equipped. There is a critical shortage of computers available for graduate student use. Increasing the availability of computers should be placed among program priorities.

A good balance between federal, state and private funding was maintained through SIF. Almost 40% of theses were funded from SIF. This is exceptional. Also, almost half of the faculty have received CNPq fellowships.

The faculty have assumed a leadership role in forest science through the Society of Forest Research (SIF) and publication of Revista Árvore. Through this organization they also maintain contacts with forest products companies throughout Brazil as well as elsewhere in South America. The Pulp and Paper program has been named a Center of Excellence.

The program focuses strongly on production forestry. The committee was somewhat concerned that the program placed relatively little emphasis on areas of forest science, not associated with timber production. Brasilian forests are of intense international interest and are the subject of research projects of investigators from the entire world. It is essential that the program develop stronger ties with investigators working within Brasil through international research projects.

Participation in international scholarship and activities was lower among Forest Science faculty than among other programs we visited. Between 20 and 25% of the publications of the department are in international journals, which is less than desired. Almost half of these publications are from two faculty members; 50% of the faculty seldom publish in international journals. While there is a need to publish a component of the department's research results nationally, there is also a need to make them more readily available to an international audience. The committee feels that the research conducted by the faculty is of high-quality and would be of great international interest and a greater portion should be published in english-language journals that receive the highest circulation.

While the Forest Science program is a strong program, particularly in the area of production forestry, greater programmatic emphasis in non-wood production areas, such as in plant biodiversity and non-timber products is encouraged. The graduate program is of high quality and we encourage greater exposure through increased participation in international scholarship.

Graduate Program in Genetics and Breeding

The faculty in the program includes over 30 individuals, a number comparable or higher than genetics and breeding programs at major international institutions. About half of the faculty have obtained their doctoral degree abroad. Nearly 70% of the faculty have been recognized with a CNPq fellowship and seven have international postdoctoral experience. A strength of this program is its broad mix of classical and more modern genetic and breeding approaches. The program has a long tradition in classical breeding but has been able to successfully incorporate newer methods such as marker-assisted selection and tissue culture.

As a *general* comment on Genetics and Breeding programs throughout North and South America (as well as other programs in the agricultural sciences), the committee is aware of the attraction to new biotechnology methods and the growing funding for their research. This prompts the general caution to researchers and funding agencies on the dangers of letting

traditional methods fall behind, as the novel molecular methods receive much of the publicity and financial support. There is increasing evidence that all findings from the molecular area will still need to be implemented using traditional methods when applied to their respective fields. The existence of a majority of students, involved in molecular methods, can sometimes represent a lack of balance to a program – both in terms of the actual *curriculum* and the availability of needed *infrastructure.* Programs of this nature need to ensure that each discipline receives a basic knowledge of the other, and does not graduate with an ignorance of the strengths and weaknesses associated with each. Program coordinators should also ensure that the requisite equipment is present for both fields to perform optimally. As an example, traditional methods regularly involve the analyses of extremely large data sets (e.g., modeling, parameter estimation and simulations) and, therefore, require computational facilities that transcend the use of simple spread-sheet applications. These needs should not be overlooked in the overall structure of a Genetics and Breeding program.

The research areas and thesis topics are similar to those at major research universities in North America. Productivity in the program is high, whether measured by the number of graduate advisees, publications, or other outputs such as new varieties. About 25% of the articles are published in high quality international journals. A high proportion of graduate students pursue a doctoral degree. The courses taught cover the major topics required for such a program. In addition, the program benefits from many courses taught in related areas such as phytopathology, molecular biology, plant biology, and statistics. The faculty is involved in numerous collaborations with other Brazilian institutions and private companies, as well as institutions in the U.S. Funding for this research originates principally with federal and state foundations but also with private companies. Facilities are more than adequate, especially at the BioAgro.

The committee's overall assessment is that this program is at the international level. Its activities and outputs are comparable to those at premier land-grant institutions in North America. The program is encouraged to take on a stronger role in Latin America.

Graduate Program in Plant Pathology

The faculty of this program is of relatively small size with 17 faculty members, but it appears to be able to cover the major areas of the field. A significant majority of the faculty obtained their doctoral degree at institutions abroad. About 60% have been recognized with a CNPq fellowship and 40% had obtained a postdoctoral fellowship. Of note are recent hires of younger faculty, who are strengthening the department in molecular methods and epidemiology. Overall, the faculty of this group is qualitatively quite strong.

The faculty is involved in numerous international collaborations, mostly outside South America (a collaboration with Argentina being an exception). The committee notes the stated intention of the faculty to increase its interactions with other Latin American countries. It is also involved in numerous collaborations with other Brazilian institutions and is an active participant in national professional meetings.

Research topics include both applied and more basic approaches. Productivity is high as measured by publication output. A significant proportion of papers (about 30%) were published in high quality international journals. The group has recently seen a significant increase in the number of doctoral students, a sign that the field of plant pathology is maturing in Brazil. The fact that the program is able to capture a significant number of these students speaks for its quality. The faculty has also nearly doubled the number of courses available to students. It has also tightened the requirements for scheduling the qualifying examination in a timely fashion and has simplified the format of this examination. Relatively few students are foreign students, a surprising observation given the international orientation of the program.

The facilities were adequate although time constraints did not allow the committee to visit greenhouses or field facilities. The program also has a significant representation in the BioAgro, which significantly enhances the quality of its laboratory space. We note the development of the Plant Disease Clinic as a focal point for extension activity. We also note the role of the department in developing genetic and cultural solutions to control leaf rust of coffee and eucalyptus, in collaboration with other departments.

The committee's overall assessment is that this program is of international quality. We suggest stronger interactions with Latin American countries. The committee encourages further development of the clinic to increase its practical impact and complement its consulting role to companies.

Graduate Program in Soil Science

This is an exceptional faculty with a strong sense of mission. They are motivated and highly productive. The faculty is not large. It is comparable in size to mid-sized programs in soil science programs in North America. The breadth of faculty expertise is good but would benefit from greater expertise in the area of soil microbiology. The 19 faculty advisors currently advise 59 D. Sc. and 25 M. S. candidates. All faculty members hold doctorate degrees and eight of the fourteen faculties received their doctorate degrees outside of Brasil. This represents outstanding diversity and commitment on the part of the department. Less than 50% of the faculty are full professors indicating a relatively young and developing faculty. The faculty have assumed a leadership role in the development of soil science within Brazil and are responsible for editing three quality periodicals and a number of books.

Almost two-thirds of the faculty publish regularly in major international journals and at least six of the faculty have substantial contact with colleagues outside the country, have acted as visiting scholars and are well-known internationally. More than 30% of the publications are in international english-language journals. This is exceptional.

Students in this program are aware of opportunities afforded through the "sandwich" program and are aggressively pursuing these opportunities.

The majority of research support comes from state and federal sources. This faculty has been particularly successful obtaining CNPq scholarships and this has increased their funding. Additional support from industry includes support for the Cooperative Program on Soil and Plant Nutrition, National Plan for Coffee Research and Development and Plena Engenharia. The combined funding for the program is good. Additional emphasis should be placed on securing private-sector funding as a way to balance year-to-year variability in public funding and to further increase interaction with the industrial and private sectors.

Overall, this program compares extremely well with programs in the United States in terms of faculty scholarship, national and international leadership and the quality and quantity of M. S. and D. S students. Students graduated from this program will be competitive with students graduating from the best programs in North America.

Concluding comments

In conclusion, the committee was greatly impressed with overall quality of the programs visited. It feels that they compare extremely favorably with North-American and European counterparts. We are of the opinion that they merit their current high rankings and several may deserve higher.

We appreciate the opportunity to visit UFV and thank all concerned for their cooperation and time. We hope that our comments will serve to help UFV in its continued search for excellence.

Resolução CNE/CES Nº I, de 3 de abril de 2001

Estabelece normas para o funcionamento de cursos de pós-graduação.

O Presidente da Câmara de Educação Superior do Conselho Nacional de Educação, no uso de suas atribuições legais, e tendo em vista o disposto no Art. 9º, § 2º, alínea "g", da Lei 4.024, de 20 de dezembro de 1961, com a redação dada pela Lei 9.131, de 25 de novembro de 1995, e nos artigos 9º, incisos VII e IX, 44, inciso III, 46 e 48, §§ 1º e 3º da Lei 9.394, de 20 de dezembro de 1996, e o Parecer CNE/CES 142/2001, homologado pelo Senhor Ministro da Educação em 15 de março de 2001,

RESOLVE:

Art. 1º Os cursos de pós-graduação *stricto sensu*, compreendendo programas de mestrado e doutorado, são sujeitos às exigências de autorização, reconhecimento e renovação de reconhecimento previstas na legislação.

§ 1º A autorização, o reconhecimento e a renovação de reconhecimento de cursos de pós-graduação *stricto sensu* são concedidos por prazo determinado, dependendo de parecer favorável da Câmara de Educação Superior do Conselho Nacional de Educação, fundamentado nos resultados da avaliação realizada pela Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES e homologado pelo Ministro de Estado da Educação.

§ 2º A autorização de curso de pós-graduação *stricto sensu* aplica-se tão-somente ao projeto aprovado pelo CNE, fundamentado em relatório da CAPES.

§ 3º O reconhecimento e a renovação do reconhecimento de cursos de pós-graduação *stricto sensu* dependem da aprovação do CNE, fundamentada no relatório de avaliação da CAPES.

§ 4º As instituições de ensino superior que, nos termos da legislação em vigor, gozem de autonomia para a criação de cursos de pós-graduação devem formalizar os pedidos de reconhecimento dos novos cursos por elas criados até, no máximo, 12 (doze) meses após o início do funcionamento dos mesmos.

§ 5º É condição indispensável para a autorização, o reconhecimento e a renovação de reconhecimento de curso de pós-graduação *stricto sensu* a comprovação da prévia existência de grupo de pesquisa consolidado na mesma área de conhecimento do curso.

§ 6º Os pedidos de autorização, de reconhecimento e de renovação de reconhecimento de curso de pós-graduação *stricto sensu* devem ser apresentados à CAPES, respeitando-se as normas e procedimentos de avaliação estabelecidos por essa agência para o Sistema Nacional de Pós-Graduação.

Art. 2º Os cursos de pós-graduação *stricto sensu* oferecidos mediante formas de associação entre instituições brasileiras ou entre estas e instituições estrangeiras obedecem às mesmas exigências de autorização, reconhecimento e renovação de reconhecimento estabelecidas por esta Resolução.

Parágrafo único. A emissão de diploma de pós-graduação *stricto sensu* por instituição brasileira exige que a defesa da dissertação ou da tese seja nela realizada.

Art. 3º Os cursos de pós-graduação *stricto sensu* a distância serão oferecidos exclusivamente por instituições credenciadas para tal fim pela União, conforme o disposto no § 1º do artigo 80 da Lei 9.394, de 1996, obedecendo às mesmas exigências de autorização, reconhecimento e renovação de reconhecimento estabelecidas por esta Resolução.

§ 1º Os cursos de pós-graduação *stricto sensu* oferecidos a distância devem, necessariamente, incluir provas e atividades presenciais.

§ 2º Os exames de qualificação e as defesas de dissertação ou tese dos cursos de pós-graduação *stricto sensu* oferecidos a distância devem ser presenciais, diante de banca examinadora que inclua pelo menos 1 (um) professor não pertencente ao quadro docente da instituição responsável pelo programa.

§ 3º Os cursos de pós-graduação *stricto sensu* oferecidos a distância obedecerão às mesmas exigências de autorização, reconhecimento e renovação de reconhe-cimento estabelecidas por esta Resolução.

§ 4º A avaliação pela CAPES dos cursos de pós-graduação *stricto sensu* a distância utilizará critérios que garantam o cumprimento do preceito de equivalência entre a qualidade da formação assegurada por esses cursos e a dos cursos presenciais.

Art. 4º Os diplomas de conclusão de cursos de pós-graduação *stricto sensu* obtidos de instituições de ensino superior estrangeiras, para terem validade nacional, devem ser reconhecidos e registrados por universidades brasileiras que possuam cursos de pós-graduação reconhecidos e avaliados na mesma área de conhecimento e em nível equivalente ou superior ou em área afim.

§ 1º A universidade poderá, em casos excepcionais, solicitar parecer de instituição de ensino especializada na área de conhecimento na qual foi obtido o título.

§ 2º A universidade deve pronunciar-se sobre o pedido de reconhecimento no prazo de 6 (seis) meses da data de recepção do mesmo, fazendo o devido registro ou devolvendo a solicitação ao interessado, com a justificativa cabível.

§ 3º Esgotadas as possibilidades de acolhimento do pedido de reconhecimento pelas universidades, cabe recurso à Câmara de Educação Superior do Conselho Nacional de Educação.

Art. 5º É admitida, excepcionalmente, a obtenção de título de doutor mediante defesa direta de tese, de acordo com o que estabelecerem as normas da universidade onde tal defesa for realizada.

§ 1º A defesa direta de tese de doutorado só pode ser feita em universidade que ofereça programa de doutorado reconhecido na mesma área de conhecimento.

§ 2º O diploma expedido após defesa direta de tese de doutorado tem validade nacional.

Art. 6º Os cursos de pós-graduação *lato sensu* oferecidos por instituições de ensino superior ou por instituições especialmente credenciadas para atuarem nesse nível educacional independem de autorização, reconhecimento e renovação de reconhecimento e devem atender ao disposto nesta Resolução.

§ 1º Incluem-se na categoria de curso de pós-graduação *lato sensu* os cursos designados como *MBA (Master Business Administration)* ou equivalentes.

§ 2º Os cursos de pós-graduação *lato sensu* são oferecidos para matrícula de portadores de diploma de curso superior.

Art. 7º Os cursos de pós-graduação *lato sensu* ficam sujeitos à supervisão dos órgãos competentes a ser efetuada por ocasião do recredenciamento da instituição.

Art. 8º As instituições que ofereçam cursos de pós-graduação *lato sensu* deverão fornecer informações referentes a esses cursos, sempre que solicitadas pelo órgão coordenador do Censo do Ensino Superior, nos prazos e demais condições estabelecidos.

Art. 9º O corpo docente de cursos de pós-graduação *lato sensu* deverá ser constituído, necessariamente, por, pelo menos, 50% (cinqüenta por cento) de professores portadores de título de mestre ou de doutor obtido em programa de pós-graduação *stricto sensu* reconhecido.

Art. 10 Os cursos de pós-graduação *lato sensu* têm duração mínima de 360 (trezentos e sessenta) horas, nestas não computado o tempo de estudo individual ou em grupo, sem assistência docente, e o reservado, obrigatoriamente, para elaboração de monografia ou trabalho de conclusão de curso.

Art. 11 Os cursos de pós-graduação *lato sensu* a distância só poderão ser oferecidos por instituições credenciadas pela União, conforme o disposto no § 1º do art. 80 da Lei 9.394, de 1996.

Parágrafo único. Os cursos de pós-graduação *lato sensu* oferecidos a distância deverão incluir, necessariamente, provas presenciais e defesa presencial de monografia ou trabalho de conclusão de curso.

Art. 12 A instituição responsável pelo curso de pós-graduação *lato sensu* expedirá certificado a que farão jus os alunos que tiverem obtido aproveitamento segundo os critérios de avaliação previamente estabelecidos, assegurada, nos cursos presenciais, pelo menos, 75% (setenta e cinco por cento) de freqüência.

§ 1º Os certificados de conclusão de cursos de pós-graduação *lato sensu* devem mencionar a área de conhecimento do curso e ser acompanhados do respectivo histórico escolar, do qual devem constar, obrigatoriamente:

I – relação das disciplinas, carga horária, nota ou conceito obtido pelo aluno e nome e qualificação dos professores por elas responsáveis;

II – período e local em que o curso foi realizado e a sua duração total, em horas de efetivo trabalho acadêmico;

III – título da monografia ou do trabalho de conclusão do curso e nota ou conceito obtido;

IV - declaração da instituição de que o curso cumpriu todas as disposições da presente Resolução e

V – indicação do ato legal de credenciamento da instituição, no caso de cursos ministrados a distância.

§ 2º Os certificados de conclusão de cursos de pós-graduação *lato sensu* devem ter registro próprio na instituição que os expedir.

§ 3º Os certificados de conclusão de cursos de pós-graduação *lato sensu* que se enquadrem nos dispositivos estabelecidos nesta Resolução terão validade nacional.

Art. 13 Esta Resolução entrará em vigor na data de sua publicação, revogadas a Resolução CFE 5/83, as Resoluções CNE/CES 2/96, 1/97 e 3/99 e demais disposições em contrário.

ROBERTO CLÁUDIO FROTA BEZERRA
Presidente da Câmara de Educação Superior

Resolução CNE/CES Nº 2, de 3 de abril de 2001

Dispõe sobre os cursos de pós-graduação *stricto sensu* oferecidos no Brasil por instituições estrangeiras, diretamente ou mediante convênio com instituições nacionais

O Presidente da Câmara de Educação Superior do Conselho Nacional de Educação, no uso de suas atribuições legais, e tendo em vista o disposto no Parecer CNE/CES 142/2001, homologado pelo Senhor Ministro da Educação em 15 de março de 2001,

RESOLVE:

Art. 1º Os cursos de pós-graduação *stricto sensu* oferecidos no Brasil por instituições estrangeiras, diretamente ou mediante convênio com instituições nacionais, deverão imediatamente cessar o processo de admissão de novos alunos.

§ 1º As instituições que se enquadram na situação prevista no *caput* deste artigo deverão, no prazo de 90 (noventa) dias, encaminhar à Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES a relação dos diplomados nesses cursos, bem como dos alunos matriculados, com a previsão do prazo de conclusão.

§ 2º Os diplomados nos cursos referidos no *caput* deste artigo deverão encaminhar a documentação necessária ao processo de reconhecimento por intermédio da CAPES.

Art. 2º Esta Resolução entrará em vigor na data de sua publicação, revogadas as disposições em contrário.

ROBERTO CLÁUDIO FROTA BEZERRA
Presidente da Câmara de Educação Superior

OPINIÃO

O Imbróglio dos "Fora de Sede"

Jaime Evaldo Fensterseifer[*]

Um fator que distinguiu a avaliação da pós-graduação de 2001 em relação à de 1998, além do "apagão" das 17h, que tumultuou o trabalho das comissões de área, foi sem dúvida o fenômeno dos "fora de sede". Trata-se de cursos de pós-graduação *stricto sensu* oferecidos fora de suas sedes por Programas de Pós-Graduação (PPGs) reconhecidos pela Capes, em convênio com instituições receptoras. Tais cursos foram inspirados, na sua grande maioria, no Subprograma de Mestrado Interinstitucional (MINTER), do PICDT, porém não foram submetidos à apreciação da Capes. O termo "Interinstitucional" tem sido até mesmo utilizado pelos PPGs para caracterizar seus cursos oferecidos fora da sede. A quase totalidade da oferta destes cursos ocorreu no período 1998-2000, o triênio coberto pela Avaliação 2001.

A problemática e suas implicações

A celeuma causada pelos cursos fora da sede ocorreu quando em novembro de 2000 a Capes comunicou formalmente aos Programas, por meio do Ofício Circular Nº 0168/00/PR/CAPES e com base em deliberações do Conselho Técnico-Científico (CTC), que suspendessem novas matrículas nessa modalidade e estabeleceu que a oferta para novas turmas deveria ser previamente submetida à avaliação da agência. No mesmo ofício foram colocadas ainda as duas opções de enquadramento para os cursos em andamento e para propostas de novos cursos: como proposta concebida nos moldes do MINTER ou como proposta de curso novo. Os coordenadores de PPGs com oferta de cursos fora da sede ficaram surpresos com o conteúdo, e revoltados com o tom, considerado por eles ameaçador, do ofício circular que comunicava as deliberações do CTC. Como essas deliberações tinham sérias conseqüências também para os alunos e os egressos destes cursos, estava criado um conflito envolvendo três atores em um triângulo conflituoso: (1) os PPGs, que julgavam estar dando sua contribuição para a capacitação de docentes para o ensino de graduação; (2) a Capes, não reconhecendo a validade dos títulos emitidos aos egressos dos cursos fora da sede que não haviam sido submetidos à sua avaliação e (3) os alunos e os egressos desses cursos, preocupados com a validade de seus diplomas.

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Para se entender melhor a natureza do conflito faz-se necessário analisar o papel e a postura de cada um dos atores do triângulo. Os PPGs, agentes do processo, alegam terem sido estimulados pela Capes, com a implantação do MINTER, a oferecer cursos em convênio com instituições receptoras. Eles alegam ainda que as normas do MINTER eram confusas e que, no seu entendimento, a menos que o Programa desejasse solicitar recursos à Capes, não havia necessidade de submeter cada novo curso à sua apreciação. Embora nada indique que tenha havido má-fé por parte dos mesmos, tendo os cursos oferecidos fora da sede até mesmo passado pela avaliação e o acompanhamento de suas Pró-Reitorias de Pós-Graduação, a postura dos PPGs é passível de crítica por terem agido com base em meras suposições e por, apesar de declararem atuar dentro das normas preconizadas pelo MINTER, não tê-las respeitado, em muitos casos, no que diz respeito ao número de cursos (turmas) fora da sede permitido (uma única turma por vez) e ao percentual mínimo de alunos que deve ser preenchido por docentes e técnicos do quadro permanente das instituições receptoras (70%). É de se estranhar também o fato de muitos PPGs não terem incluído, em seus relatórios anuais de 1998 e 1999 encaminhados à Capes, os cursos oferecidos fora da sede, pois considerar os alunos matriculados nestes cursos como alunos regulares do Programa e não incluí-los no relatório é, no mínimo, contraditório. Quanto à motivação para a oferta de cursos nessa modalidade, ela foi, sem dúvida, um misto de "contribuição para a capacitação docente das universidades receptoras" e "oportunidade para carrear recursos aos Programas e complementação salarial aos seus docentes", com graus variados de ênfase em uma e outra.

Embora não se possa aceitar como válida para justificar a legitimidade destes cursos a razão invocada pelos PPGs de que não havia normas claras que regulamentassem a matéria, é mister reconhecer que havia uma certa confusão a respeito, particularmente em relação à necessidade ou não de submeter à apreciação da Capes cada proposta de nova turma. Apesar dessa confusão, a postura da Capes, no seu papel de promover o desenvolvimento e preservar a qualidade da pós-graduação, é defensável e justificada, pois, conforme veremos a seguir, num levantamento realizado em meados de 2000 ficou constatada uma desmesurada oferta de cursos nesta modalidade.

O fato de a Capes ter solicitado aos Programas em 1999 que relatassem suas atividades fora da sede, além de demonstrar que ela tinha conhecimento da existência destes cursos, reforçou a crença por parte dos PPGs de que estas atividades eram reconhecidas pela agência e, portanto, legítimas. Mas se esse fato permite, por um lado, esta interpretação, por outro lado ele implica que os Programas tinham plena consciência do impacto que a oferta destes cursos poderia ter na sua avaliação e, conseqüentemente, no seu conceito. Isso deveria ter-se constituído em elemento limitador da oferta de cursos nessa modalidade, mas infelizmente tal não foi o caso para alguns Programas; o levantamento de 2000 mostrou que alguns PPGs foram muito além do razoável, e que a oferta de cursos nessa modalidade estava muito mais difundida no país do que se imaginara. Justificava-se, pois, plenamente, as deliberações do CTC manifestada no Ofício Circular. Mas se a argumentação acima permite atribuir total responsabilidade aos PPGs pela oferta de cursos fora da sede, com todas as conseqüências inerentes, pode-se acrescentar, também, que a Capes, estando ciente da existência destes cursos no mínimo desde 1999, esperou demais para agir e contribuiu, assim, para sua difusão desenfreada por todo o país, uma vez que havia grande demanda para esta modalidade de curso.

O terceiro vértice do triângulo é, evidentemente, o mais frágil: os alunos e egressos destes cursos, que vieram a descobrir que os diplomas emitidos nessa modalidade não tinham validade nacional. A questão é particularmente problemática para os alunos já titulados nesta modalidade, situação essa que pode gerar conflitos entre instituições promotoras e receptoras, entre titulados nessa modalidade e instituições promotoras e receptoras e, dentro das instituições receptoras, entre docentes titulados nessa modalidade e não titulados. Ademais, a qualidade, e não apenas a validade, da formação obtida na modalidade fora da sede pode ser questionada, em alguns casos, podendo gerar conflitos entre portadores de diplomas obtidos na forma tradicional, de um lado, e titulados na modalidade fora da sede, de outro.

O que mostrou a Avaliação 2001

Como é do conhecimento de todos os PPGs, os Programas com três ou mais cursos oferecidos ou em andamento na modalidade fora da sede no triênio 1998-2000 tiveram avaliação especial, em separado, por uma comissão do CTC, após avaliação das atividades desenvolvidas na sede (incluindo, caso houvesse, cursos na modalidade MINTER devidamente recomendados pela Capes) pelas respectivas comissões de área. É importante lembrar que a Capes avaliou somente as atividades regulares dos PPGs, ou seja, aquelas reconhecidas pela agência; os cursos ditos fora de sede foram analisados com o único objetivo de aferir o impacto dessas atividades no desempenho do Programa na sua sede. O conceito atribuído a um Programa refere-se, portanto, unicamente às atividades desenvolvidas pelo mesmo na sua sede.

Os dados da Avaliação 2001 mostraram o seguinte: dos 30 Programas identificados com três ou mais cursos fora da sede e que haviam sido avaliados em 1998, 19 mantiveram o mesmo conceito da Avaliação 1998, 3 melhoraram o conceito e 8 pioraram. Dentre os 8 que pioraram de conceito, um foi descredenciado (seu conceito caiu para 2). Dos Programas novos (implantados a partir de 1998), dois também tiveram três ou mais cursos oferecidos fora da sede, sendo que um deles manteve o conceito da Recomendação e o outro foi descredenciado. Constata-se, assim, como se esperava, que a grande maioria dos Programas que ofereceu cursos fora da sede o fez de maneira comedida e sem prejuízo da qualidade. Mas houve Programas que extrapolaram essa atividade para além dos limites do bom-senso, mantendo cursos pelo país inteiro, em número muito acima de suas possibilidades e, portanto, com sérios prejuízos à qualidade da formação oferecida; para estes Programas (felizmente apenas dois), possivelmente os apelos do mercado prevaleceram sobre o zelo acadêmico.

Após todos os Programas com cursos fora da sede terem sido colocados sob suspeita (na visão de boa parte dos coordenadores de PPGs) pela suspensão de seus conceitos afim de receberem uma avaliação em separado, a constatação de que a maioria dos Programas agiu com as devidas preocupações acadêmicas, como mostraram os resultados da avaliação, é altamente encorajadora para a pós-graduação brasileira. Mas se o resultado destas atividades revelou-se bom na sua maior parte, permanece não resolvida a questão dos titulados nessa modalidade antes de novembro de 2000, assim como resta a ser feita uma profunda reflexão sobre o processo de avaliação e as diversas modalidades de cursos oferecidas. Há importantes e óbvias lições a serem aprendidas por todos os três atores envolvidos.

Novos desafios

Convém lembrar, finalmente, que tratamos aqui apenas dos cursos fora da sede oferecidos no modo presencial. O ensino a distância, que se impõe cada vez mais, oferecendo novas alternativas que ampliam o alcance das atividades de formação, está ainda a merecer uma séria discussão nacional. Faz-se necessário atuar proativamente e definir minimamente critérios de qualidade que possam orientar os PPGs no uso dessa modalidade, que se difunde rapidamente, evitando assim que os cursos a distância transformem-se no *imbroglio* da Avaliação 2004.

Há que se repensar também o MINTER encontrando-se formas de evitar dois de seus efeitos que, se não são perversos, são ao menos indesejáveis: o primeiro é um tipo de endogenia que decorre de uma determinada unidade ter seus docentes titulados em uma mesma instituição (a promotora); o segundo decorre da qualidade dos alunos destes cursos, quando comparados aos alunos da sede, pois são selecionados de um universo extremamente restrito (os docentes de uma determinada área do conhecimento de uma ou poucas instituições emergentes); neste caso, a qualidade do ensino aportado, mesmo sendo a mesma da sede, não assegura a qualidade da aprendizagem.

As diversas experiências existentes na modalidade profissionalizante do mestrado também precisam ser analisadas e discutidas. Várias instituições até mesmo ofereceram no triênio 1998-2000 cursos fora da sede nessa modalidade, apesar de não terem relação com o espírito que norteou a implantação do Subprograma MINTER. Ou teriam?

O processo de internacionalização que vem ocorrendo na Pós-Graduação também está a merecer uma séria análise. Esse processo vem ocorrendo de fora para dentro, seguindo a mesma lógica empresarial que, em muitos casos, se não na maioria dos casos, tem sido perversa aos interesses nacionais.

Enfim, as questões a serem enfrentadas são muitas, mas as oportunidades para uma atuação cada vez mais eficaz por parte da Capes no contínuo esforço de desenvolvimento da pós-graduação são igualmente muitas e estão a nos desafiar.

Avaliação dos cursos com atividades fora de sede

A avaliação trienal dos programas de pós-graduação, pela sua excepcional importância para a definição e condução da política de desenvolvimento desse nível de ensino no país e pelas repercussões de seus resultados para a atuação dos programas avaliados, merece da CAPES – de seus colegiados superiores, comissões de área, representantes de área e consultores envolvidos nessa atividade –, a adoção de toda cautela possível no sentido de assegurar a adequada fundamentação e justeza de todas as etapas do processo.

No caso de avaliação de desempenho dos programas responsáveis pela oferta de cursos "fora de sede", face ao caráter especial e à multiplicidade de formas e condições de promoção dessas iniciativas, o Conselho Técnico-Científico, CTC, julgou ser indispensável a adoção inicial, sob sua coordenação, das seguintes providências:

- levantamento de informações complementares junto aos programas para suprirem-se as lacunas observadas na base de dados da CAPES a respeito de tais cursos;
- análise dos resultados desse levantamento por uma comissão especial, integrada por membros do referido conselho, tendo em vista a melhor caracterização do universo dessas iniciativas e a proposição do esquema a ser adotado na avaliação do desempenho dos programas nelas envolvidos.

Considerando os resultados do trabalho apresentado pela comissão supramencionada, o CTC aprovou o seguinte esquema de procedimentos para a avaliação dos programas responsáveis pela oferta de cursos "fora de sede":

- **sobre os programas com até duas iniciativas "fora de sede"**, ou iniciativas desse tipo já devidamente aprovadas pela CAPES, as comissões de área teriam condições de, com base nas informações disponíveis, avaliar adequadamente o conjunto das atividades por eles desenvolvidas no período, podendo o CTC decidir-se sobre o parecer e a nota por elas atribuídos a cada um desses programas, sem a necessidade de nenhuma outra providência complementar;
- **sobre os programas com mais de duas iniciativas "fora de sede"**, a justa avaliação de seus desempenhos dependeria do devido conhecimento de suas respectivas realidades e da adequada compreensão das condições de funcionamento dos cursos por eles oferecidos, o que impunha a necessidade de complementar as informações disponíveis com dados obtidos em visitas de comissões de consultores às sedes dos programas ou aos locais de oferta dos cursos em questão.

Nesse contexto, a decisão do CTC de preceder sua decisão sobre a avaliação do desempenho dos programas responsáveis por mais de dois cursos "fora de sede" com a análise dos pareceres de comissões de consultores visa à preservação dos interesses desses programas de terem suas atividades adequadamente consideradas mediante processo bem fundamentado e que pondere devidamente suas respectivas realidades.

Uma vez concluídos os trabalhos das referidas comissões, o CTC, considerando o conjunto de informações e pareceres disponíveis, decidirá sobre os resultados da avaliação do desempenho dos programas em questão.

Cursos Novos Recomendados na 62ª Reunião do CTC

Cursos novos recomendados pelo Conselho Técnico-Científico na reunião realizada nos dias 3 e 4 de outubro de 2001:

CURSO	IES	NÍVEL	NOTA
CIÊNCIAS EXATAS E DA TERRA			
Ciência da Computação	FUFMS	MESTRADO	**3**
Redes de Computadores	UNIFACS	MESTRADO PROFIS.	**3**
Matemática Aplicada	UFPR	MESTRADO	**3**
Estatística	UFRJ	DOUTORADO	**4**
Ciências Cartográficas	UNESP-PP	DOUTORADO	**4**
Geologia	UFMG	DOUTORADO	**4**
CIÊNCIAS BIOLÓGICAS			
Biologia Celular e Molecular	UFPR	DOUTORADO	**4**
Biotecnologia	UNESP-ARAR	DOUTORADO	**4**
Farmacologia Clínica	UFC	MESTRADO PROFIS.	**5**
Botânica	FCAP	MESTRADO	**3**
Biologia Animal	UFES	MESTRADO	**3**
Biotecnologia	UFRGS	MESTRADO PROFIS.	**5**
Biologia Animal	UNESP-SJRP	MESTRADO	**3**
ENGENHARIAS			
Engenharia Civil	UNICAMP	DOUTORADO	**4**
Tecnologia Ambiental e Recursos Hídricos	UNB	DOUTORADO	**5**
Engenharia Civil	UFAL	MESTRADO	**3**
Tecnologia Ambiental	UNAERP	MESTRADO PROFIS.	**4**
Engenharia de Transportes	UFC	MESTRADO	**3**
Engenharia de Computação	IPT	MESTRADO PROFIS.	**3**
Engenharia de Materiais	PUC-RS	MESTRADO	**3**
Engenharia Química	UFU	DOUTORADO	**4**
Engenharia Mecânica	UFPR	MESTRADO	**3**
Engenharia de Produção e Sistemas	PUC-PR	MESTRADO	**3**
Engenharia de Produção	UA	MESTRADO PROFIS.	**3**
Engenharia de Produção	UFPE	DOUTORADO	**4**
CIÊNCIAS DA SAÚDE			
Distúrbios da Comunicação Humana	USP	MESTRADO DOUTORADO	**4** **4**
Enfermagem	FURG	MESTRADO	**3**
Enfermagem	UFRN	MESTRADO	**3**
Medicina Tropical	UFG	DOUTORADO	**4**
Nutrição: Metabolismo e Dietética	UFSC	MESTRADO	**3**
Ciências Aplicadas em Saúde	CIP-SP	MESTRADO DOUTORADO	**4** **4**
Saúde e Comportamento	UCPEL	MESTRADO	**3**
Medicina (Pediatria)	UFPR	DOUTORADO	**4**
Saúde Coletiva	ULBRA	MESTRADO	**3**
Medicina Tropical e Infectologia	FMTM	DOUTORADO	**4**
Clínica Odontológica	UNIMAR	MESTRADO	**3**
Odontologia	UNISA	MESTRADO PROFIS.	**3**
CIÊNCIAS AGRÁRIAS			

Aquicultura	FURG	MESTRADO	**4**
Ciências Veterinárias	UECE	DOUTORADO	**4**
Agronomia (Entomologia Agrícola)	UNESP-JAB	DOUTORADO	**4**
Sementes	UFPEL	MESTRADO PROFIS.	**4**
CIÊNCIAS SOCIAIS APLICADAS			
Administração	UFLA	DOUTORADO	**4**
Ciências Econômicas	UERJ	MESTRADO	**3**
Ciência da Informação	UFBA	MESTRADO	**3**
Ciência da Informação	UNESP-MAR	MESTRADO	**3**
CIÊNCIAS HUMANAS			
História	UFBA	DOUTORADO	**4**
Psicologia	USF	MESTRADO	**4**
Educação	UERJ	DOUTORADO	**4**
Educação	UFPE	DOUTORADO	**4**
Educação	UMESP	MESTRADO	**3**
Educação	USF	MESTRADO	**3**
Políticas Públicas	FJN	MESTRADO PROFIS.	**3**
LINGUÍSTICAS, LETRAS E ARTES			
Letras e Cultura Regional	UCS	MESTRADO	**3**
Letras Portuguesa e Literatura Para Educação Básica	UFAL	MESTRADO PROFIS.	**4**
História da Literatura	FURG	MESTRADO	**3**
Literatura e Crítica Literária	PUC-SP	MESTRADO	**3**
MULTIDISCIPLINAR			
Desenvolvimento e Meio Ambiente	UFPI	MESTRADO	**3**

Cursos Novos Recomendados na 64ª Reunião do CTC

Cursos novos recomendados pelo Conselho Técnico-Científico em reunião realizada nos dias 13 e 14 de dezembro de 2001:

CURSO	IES	NÍVEL	NOTA
CIÊNCIAS BIOLÓGICAS			
C. Biológicas (Botânica)	UFRJ	DOUTORADO	4
Botânica	UEFS	DOUTORADO	4
Entomol. e Conservação da Biodiversidade	FUFMS	MESTRADO	3
ENGENHARIAS			
Engenharia Elétrica	UEL	MESTRADO	3
CIÊNCIAS DA SAÚDE			
Odontologia	UFRGS	DOUTORADO	4
Ciências da Saúde	UFRN	MESTRADO	3
Análises Clínicas	UNESP-ARAR	DOUTORADO	4
Ciências Farmacêuticas	UFPR	MESTRADO	3
Ciências Farmacêuticas	UFC	MESTRADO	3
Saúde Pública	UFMG	DOUTORADO	4
Patologia Experimental	UEL	MESTRADO	3
Fisioterapia	UFSCAR	DOUTORADO	5
Fisiopatologia Médica	UNICAMP	MESTRADO	6

		DOUTORADO	6
Ciências da Reabilitação	UFMG	MESTRADO	4
CIÊNCIAS AGRÁRIAS			
Medicina Veterinária	UFG	DOUTORADO	4
Ciência Animal	UEL	DOUTORADO	4
Zootecnia (Qualidade e Produtividade Animal)	USP	DOUTORADO	4
Rec. Pesq. e Aquicultura	UFRPE	MESTRADO	3
Ciência Animal	FUFMS	MESTRADO	3
CIÊNCIAS SOCIAIS APLICADAS			
Políticas Públicas	FUFPI	MESTRADO	3
Política Social	UNB	DOUTORAD	5
Urbanismo	UFRJ	DOUTORADO	4
CIÊNCIAS HUMANAS			
Psicologia	UFBA	MESTRADO	3
Ciência Política	UFPE	DOUTORADO	4
Antropologia	UFF	DOUTORADO	4
LINGUÍSTICAS, LETRAS E ARTES			
Teatro	UDESC	MESTRADO	3
Linguística	UNIR	MESTRADO	3
Língua Literatura e Cultura Árabe	USP	MESTRADO	3
Literatura e Cultura Russa	USP	MESTRADO	3
MULTIDISCIPLINAR			
Ciências Ambientais	UNESC	MESTRADO	3
Agroecologia	UEMA	MESTRADO	3
Promoção de Saúde	UNIFRAN	MESTRADO	3
Patologia Tropical	UA	MESTRADO	3
Vigilância Sanitária	FIOCRUZ	MESTRADO DOUTORADO	4 4
Ciência Ambiental	USP	DOUTORADO	4
ENSINO DE CIÊNCIAS E MATEMÁTICA			
Ensino de Ciências e Matemática	ULBRA	MESTRADO	3
Educação Científica e Tecnológica	UFSC	MESTRADO DOUTORADO	4 4
Ensino das Ciências	UFRPE	MESTRADO	3
Ciências/Educ. Matemática	UEL	MESTRADO	3
Educação em Ciências e Matemática	UFPA	MESTRADO	3
Ensino de Física	UFRGS	MESTRADO PROFS.	4
Educação em Ciências e .Matemática	PUC-RS	MESTRADO PROFS.	3
Ensino de Ciências e Matem.	UFRN	MESTRADO PROFS.	3

Instruções para encaminhamento de processo de reconhecimento de cursos de pós-graduação de instituições estrangeiras conveniadas com instituições brasileiras

Sobre os procedimentos a serem adotados pelos interessados no reconhecimento, por instituições brasileiras, de diplomas de cursos de pós-graduação *stricto sensu* oferecidos no Brasil por instituições estrangeiras, a CAPES prestou os seguintes esclarecimentos, de acordo com o previsto pela Resolução CNE/CES Nº 2, D.O.U de 9 de abril de 2001:

1. serão avaliadas exclusivamente as solicitações apresentadas pelos integrantes das relações de alunos já diplomados pelos referidos cursos, ou neles matriculados até 2 de abril de 2001, que tenham sido encaminhadas à CAPES, pelas instituições competentes, até 9 de julho do corrente ano;
2. cabe à CAPES receber as solicitações supramencionadas, identificar as instituições que deverão avaliá-las e encaminhar às pró-reitorias dessas Instituições de Ensino Superior–IES a documentação básica requerida para esse fim;

3. para a formalização dos pedidos junto à CAPES, deverão ser apresentados os seguintes documentos:
   a. requerimento a esta entidade com:
      · caracterização do pedido: nome do solicitante, nome do curso, período e local em que foi realizado, instituição promotora, nível do diploma, nome da tese, dissertação ou trabalho equivalente;
      · dados básicos do solicitante: identidade, CPF, endereço completo, telefone e e-mail;
   b. cópia do diploma a ser validado (frente e verso), autenticado pela autoridade consular brasileira (no caso de a emitente ser instituição francesa, a presente exigência é dispensada);
   c. cópia do histórico escolar ou documento equivalente (frente e verso), autenticado pela autoridade consular brasileira;
   d. programa das disciplinas cursadas, com a indicação do nome, da titulação e do vínculo institucional dos professores responsáveis;
   e. cópia autenticada do documento de identidade;
   f. cópia do diploma de graduação;
   g. curriculum vitae atualizado, simplificado;
   h. exemplar da tese, dissertação ou trabalho eqüivalente.

4. as solicitações, instruídas com os documentos exigidos, deverão ser encaminhadas à CAPES – Coordenação de Acompanhamento e Avaliação/CAA, aos cuidados da Coordenadora Rosana Arcoverde – Ministério da Educação, Anexo II, 2º andar, 70359-970, com o título "Reconhecimento de diploma de IES estrangeiras", ou podem ser entregues diretamente no Serviço de Protocolo desta entidade, em Brasilia, ou com a obtenção do devido comprovante, ou postadas no Correio, utilizando-se modalidade de serviço que assegure comprovante de remessa;

5. instituição de ensino superior responsável pela avaliação de cada pedido poderá solicitar diretamente ao interessado a apresentação de informações e documentos complementares considerados necessários – até mesmo os referentes ao pagamento de taxas eventualmente previstas;

6. a decisão final da instituição de ensino sobre o pedido de revalidação do diploma, seja a mesma favorável ou não ao pleito, deverá ser informada à CAPES dentro do prazo de 6

meses, estabelecido pelo § 2º do art. 4º, da Resolução CNE/CES Nº 1, de 3 de abril de 2001, cabendo a esta entidade efetuar a devida comunicação ao interessado.

Representantes de Área para 2002/2004

O Conselho Superior da CAPES, em sua 25ª reunião ordinária, realizada em 23 de outubro de 2001, designou os seguintes representantes de área para o triênio 2002/2004:

ÁREA	REPRESENTANTE	IES
1. ADMINISTRAÇÃO/TURISMO	SÔNIA MARIA RODRIGUES CALADO	UFPE
2. ANTROPOLOGIA/ARQUEOLOGIA	MÍRIAM PILLAR GROSSI	UFSC
3. ARQUITETURA E URBANISMO	ANAMARIA DE MORAES	PUC-RIO
4. ARTES	CELSO LOUREIRO CHAVES	UFRGS
5. ASTRONOMIA/FÍSICA	ANTÔNIO SÉRGIO TEIXEIRA PIRES	UFMG
6. CIÊNCIA DA COMPUTAÇÃO	VIRGÍLIO AUGUSTO FERNANDES ALMEIDA	UFMG
7. CIÊNCIA E TECNOLOGIA DE ALIMENTOS	ELZA IOUKO IDA	UEL
8. CIÊNCIA POLÍTICA	RENATO DE ANDRADE LESSA	IUPERJ
9. CIÊNCIAS AGRÁRIAS	FERNANDO IRAJÁ FÉLIX DE CARVALHO	UFPEL
10. CIÊNCIAS BIOLÓGICAS I	JOÃO ANTONIO PEGAS HENRIQUES	UFRGS
11. CIÊNCIAS BIOLÓGICAS II	JOÃO BATISTA CALIXTO	UFSC
12. CIÊNCIAS BIOLÓGICAS III	LUIZ RODOLPHO RAJA GABAGLIA TRAVASSOS	UNIFESP.
13. CIÊNCIAS SOCIAIS APLICADAS I	WILSON DA SILVA GOMES	UFBA
14. DIREITO	FERNANDO FACURY SCAFF	UFPA
15. ECOLOGIA	CARLOS DE ARAÚJO LIMA	INPA
16. ECONOMIA	CLÉLIO CAMPOLINA DINIZ	UFMG
17. EDUCAÇÃO	MARIA CÉLIA MARCONDES DE MORAES	UFSC
18. ENFERMAGEM	ROSALINA APARECIDA PARTEZANI RODRIGUES	USP/RP
19. ENGENHARIAS I	VAHAN AGOPYAN	USP
20. ENGENHARIAS II	CÉSAR COSTAPINTO SANTANA	UNICAMP
21. ENGENHARIAS III	ÁLVARO TOUBES PRATA	UFSC
22. ENGENHARIAS IV	SANDOVAL CARNEIRO JÚNIOR	UFRJ
23. ENSINO DE CIÊNCIAS E MATEMÁTICA	MARCO ANTONIO MOREIRA	UFRGS
24. FARMÁCIA	ELOIR PAULO SCHENKEL	UFSC
25. FILOSOFIA/TEOLOGIA	OSWALDO GIACÓIA JÚNIOR	UNICAMP
26. FISIOTERAPIA/EDUCAÇÃO FÍSICA	EDUARDO KOKUBUN	UNESP/RC
27. GEOCIÊNCIAS	SONIA MARIA BARROS DE OLIVEIRA	USP
28. GEOGRAFIA	MAURÍCIO DE ALMEIDA ABREU	UFRJ
29. HISTÓRIA	MARIA STELLA MARTINS BRESCIANI	UNICAMP
30. LETRAS/LINGÜÍSTICA	ANTÔNIO DIMAS DE MORAES	USP
31. MATEMÁTICA/PROBABILIDADE E ESTATÍSTICA	DAN MARCHESIN	IMPA
32. MEDICINA I	EMMANUEL DE ALMEIDA BURDMANN	FAMERP
33. MEDICINA II	JAIR DE JESUS MARI	UNIFESP
34. MEDICINA III	JOSÉ RENAN DA CUNHA MELO	UFMG
35. MEDICINA VETERINÁRIA	RÔMULO CERQUEIRA LEITE	UFMG
36. MULTIDISCIPLINAR	CLÁUDIO AUGUSTO MACHADO SAMPAIO	UNIFESP
37. ODONTOLOGIA	ALTAIR ANTONINHA DEL BEL CURY	UNICAMP
38. PLANEJAMENTO URBANO/DEMOGRAFIA	DIANA REIKO TUTIYA OYA SAWYER	UFMG
39. PSICOLOGIA	PAULO ROGÉRIO MEIRA MENANDRO	UFES
40. QUÍMICA	ALFREDO ARNÓBIO DE SOUZA DA GAMA	UFPE
41. SAÚDE COLETIVA	MOISÉS GOLDBAUM	USP
42. SERVIÇO SOCIAL/ECONOMIA DOMÉSTICA	DENISE BOMTEMPO BIRCHE DE CARVALHO	UNB
43. SOCIOLOGIA	JOSÉ REGINALDO PRANDI	USP

Composição do Conselho Técnico-Científico -- CTC

O Conselho Técnico-Científico da CAPES , na gestão 2001/2004, está assim composto:

- Alfredo Arnóbio de Souza da Gama (UFPE)
- Alice Eiko Murakami (UEM)
- Altair Antoninha Del Bel Cury (UNICAMP)
- Antônio Dimas (USP)
- Celso Gianetti Loureiro Chaves (UFRGS)
- Clélio Campolina Diniz (UFMG)
- Jair de Jesus Mari (UNIFESP)
- João Batista Calixto (UFSC)
- Luiz Rodolpho Raja Gabaglia (UNIFESP)
- Marcelo Arno Nierling (ANPG)
- Mauricio de Almeida Abreu (UFRJ)
- Míriam Pillar Grossi (UFSC)
- Rômulo Cerqueira Leite (UFMG)
- Sandoval Carneiro Júnior (UFRJ)
- Vahan Agopyan (USP)
- Virgílio Augusto Fernandes Almeida (UFMG)
- Waldemiro Gremski (FOPROP)
- Wilson da Silva Gomes (UFBA)

Avaliação da Pós-Graduação -- 2001

O sistema de avaliação de desempenho dos cursos de pós-graduação passou por várias modificações desde sua implantação em 1976, porém manteve inalterado três princípios básicos:

a) execução de todo o processo a cargo de *pares acadêmicos* escolhidos segundo critérios preestabelecidos,

b) busca continuada da elevação dos padrões de qualidade dos cursos oferecidos pelo sistema nacional de pós-graduação e

c) utilização dos resultados obtidos como base para a definição da política de desenvolvimento da pós-graduação e das decisões sobre as ações de fomento das agências federais nesse nível de ensino.

Características da Avaliação da CAPES

· A avaliação da CAPES é trienal, tendo como base um esquema anual de acompanhamento do desempenho dos programas.

- A unidade de avaliação é o programa, e não o curso de mestrado ou doutorado.
- Os programas são avaliados com notas de 1 a 7, sendo 7 a nota máxima e 3 a nota correspondente ao padrão mínimo de qualidade para o funcionamento de um programa.
- 5 é a nota máxima admitida para programa com apenas mestrado.
- As notas 6 e 7 são para programas com indiscutível padrão internacional de excelência.
- Os resultados finais de cada área são homologados pelo Conselho Técnico-Científico da CAPES.

Alguns Resultados da Avaliação 2001

Foram avaliados 1.575 programas, responsáveis pela oferta de 1.548 cursos de mestrado e 862 de doutorado com um total de 96.618 alunos matriculados no sistema (33.004 no doutorado, 61.735 no mestrado acadêmico e 1.879 no profissionalizante). A execução da avaliação 2001 envolveu aproximadamente 600 consultores nacionais e 18 observadores estrangeiros. Além das 44 comissões de áreas de avaliação, foi constituída uma comissão especial para avaliar os cursos com atividades fora de sede.

- **Estágios de desenvolvimento dos programas** – a distribuição das notas mostrou que apenas 9% dos programas alcançaram as notas mais altas da escala (6 e 7); aproximadamente dois terços dos programas estão concentrados nos níveis intermediários, com notas 3 e 4; 23% dos programas obtiveram nota 5 e 65 programas (4%) não alcançaram a nota mínima para integrar o sistema nacional de pós-graduação.
- **Programas com padrão de excelência internacional** – O conjunto de programas que, numa primeira rodada de avaliação, obteve nota 5 foi submetido aos referenciais de excelência estabelecidos para os níveis mais altos da escala de avaliação. Foram identificados 149 programas (100 com nota 6 e 49 com 7) com padrões diferenciados de desempenho e alta inserção internacional no que diz respeito à liderança acadêmica e à produção científica do corpo docente de cada um desses programas.
- **Estágio de desenvolvimento das áreas avaliadas** – algumas áreas não tiveram nenhum programa enquadrado nos níveis mais elevados da escala (Administração/Turismo, Arquitetura e Urbanismo, Sociais Aplicadas l, Ecologia, Educação, Enfermagem, Farmácia, Fisioterapia/Educação Física, Geografia, Medicina lll, Planejamento Urbano/Demografia, Saúde Coletiva, Serviço Social/Economia Doméstica, Zootecnia/Recursos Pesqueiros, Ensino de Ciências e Matemática e Multidisciplinar) revelando a existência de diferentes graus de maturidade científica e de distintas estratégias de consolidação.
- **Ficha de Avaliação e Documento de Área** – o conjunto das análises realizadas que está refletido na "Ficha de Avaliação" e no "Documento de Área" garante subsídios para o planejamento dos programas, das áreas do conhecimento e do sistema de pós-graduação como um todo.

No triênio 1998-2000, o Conselho Técnico-Científico recomendou a implantação de 308 novos cursos de pós-graduação. Destes, 45% foram criados em instituições federais de ensino superior, 26% em instituições estaduais e 28% em instituições particulares.

Em 2001 o CTC recomendou 162 cursos novos, sendo 56% em instituições federais, 22% em estaduais e 22% em instituições de ensino particulares.

Programa de Qualificação Institucional - PQI

O Programa de Qualificação Institucional (PQI) visa promover o desenvolvimento das instituições públicas de ensino superior por meio da formação de docentes e de forma excepcional de técnicos, preferencialmente em nível de doutorado, no âmbito de projetos de pesquisa em cooperação nacional. Para qualificar seus professores, a instituição precisa buscar parceiros para, em conjunto, estabelecerem metas de formação e de pesquisa a serem cumpridas. A concessão dos meios para atingir os objetivos previstos envolverá *a priori* todos os docentes participantes do projeto. Com essa nova sistemática, a CAPES espera aumentar a eficiência do processo formativo, criar e/ou estreitar as ligações entre grupos de diferentes instituições e possibilitar um melhor aproveitamento dos docentes formados na sua própria instituição.

A CAPES oferecerá os mecanismos necessários para a mobilidade dos docentes envolvidos e recursos para o custeio básico dos projetos de pesquisa.

As instituições interessadas em participar do Programa de Qualificação Institucional têm prazo até 30 de abril de 2002 para enviarem projetos de cooperação em pesquisa e pós-graduação. Os projetos devem ter duração máxima de cinco anos e envolver duas ou mais equipes, sendo uma da instituição de origem dos docentes e uma ou mais das instituições cooperantes, onde ocorrerá a qualificação.