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Department of Economics
RESEARCH PAPERS

Faculty Survey and Administrators' Interview Results:
Sixth Assessment of the Science, Math and Engineering
Infrastructure at Three Universities in Kansas

prepared for

K*STAR
NSF EPSCoR Project

by

Genna M. Ott
Research Associate

and

Charles E. Krider
Professor of Business

Charles E. Krider
Professor, School of Business
Director, Institute for Public Policy and Business Research

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A copy of this report may be obtained from the K*STAR NSF EPSCoR, 127 Youngberg Hall, the University of Kansas, Lawrence, Kansas 66045.

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Executive Summary

In 1992 Kansas became a National Science Foundation (NSF) EPSCoR (Experimental Program to Stimulate Competitive Research) state to improve its ability to compete for federal research and development (R&D) dollars. Annual assessments of the status of science, engineering, and mathematics (SEM) research and infrastructure at the state's three Ph.D. granting institutions (the University of Kansas, Kansas State University and Wichita State University) have occurred since 1992. The sixth assessment (1997-98) includes three parts:

- Part I – Status of the SEM Infrastructure;
- Part II – Case Studies of Four Peer Institutions; and
- Part III – Faculty Survey and Administrators' Interviews.

A brief summary of the results of Part III follows.

Faculty Survey

In 1993 SEM faculty at Kansas State University (KSU), the University of Kansas (KU), and Wichita State University (WSU) were asked to comment upon problems and improvements in their capacity to compete for federal funds. In 1997-98, a similar survey was administered to SEM faculty at the same three universities in order to determine the current status of barriers to research and development efforts and to determine if new barriers had arisen since 1993. A total of 325 surveys were analyzed.

The results of the faculty survey indicate that many of the institutional changes that were needed in 1993 are still needed today. Major findings include:

- With regards to departmental merit review, research is considered more important than teaching which ranks higher than service. Within research, publication was considered more important, followed by grants funded and then grants submitted. It appears that grant submission efforts are not recognized in the merit review process in a way that increases the number of grant submissions.

- In Kansas, there is still a need for improved grant development and administration support services. Successful grant recipients are persistent, and successful universities minimize the effort individual researchers must expend upon the routine aspects of grant writing, particularly preparation of routine parts and monitoring. Expectations for grant assistance and services appear to be low.

- The condition of research equipment may have declined in the past five years with 31 percent of the 1997 respondents categorizing equipment as "old, unreliable, obsolete" or "not available" compared with 20 percent in 1993. Over 60 percent of the faculty felt that funding for equipment was inadequate or not available. Purchasing regulations continue to create difficulty for almost half of the faculty.

- In general, research facilities are merely adequate.

- The level of technical support and services is a barrier to research.

- Lack of funding, noncompetitive salaries, and no fee waivers for research assistants make it difficult to recruit top quality graduate students. Because any improvement in SEM research and grant activity is grounded in improving graduate education, the state's ability to recruit top quality graduate students must be a priority.

- Low faculty salaries continue to be a barrier to faculty recruitment and retention.

- The main barriers to research, as described by the respondents, are time to meet all the faculty obligations, infrastructure (equipment and facilities), graduate students (quality and funding), limited funding for research, technical support personnel, and the department's or university's reputation for research.

The EPSCoR program has had many positive benefits. It has increased collaboration between Kansas institutions, provided seed money for research, improved equipment and facilities, elevated research to a more competitive standard, and provided funding for graduate students. The results indicated frustration with the paperwork and reporting requirements, the budget periods, and the review and selection process for EPSCoR. However, overall, the survey results indicate that the program has helped and has had a positive effect on research in Kansas.

Administrators' Interviews

Eighteen key administrators at KSU, KU, and WSU were interviewed during April and May of 1998 to determine what institutional responses had been made to previous assessments of barriers to research productivity and external funding. The major findings of the interviews include:

- Funding is inadequate to support the infrastructure needed to improve the three missions of the university – undergraduate education, graduate education, and research. All three universities aspired to be research-intensive universities but they did not want this done at the expense of undergraduate teaching obligations.

- Administrators still feel that equipment, facilities, and personnel issues continue to be barriers to research. Efforts are being made to pool resources and distribute overhead funds in ways that reinvest in research.

- Administrators continue to search for funds to provide salary adjustments for productive faculty, to create and increase seed funds, and to improve grant development support services.

The barriers that face Kansas' three universities remain unchanged. The results of the faculty survey and administrators' interviews show that the universities and the state must address ways to:

- recruit and retain top level research faculty through more competitive faculty salaries and provision of start-up funds for research;

- balance the faculty obligations of research, teaching, and administration;

- change the culture to recognize the importance of extramural research funds to the school's research and teaching programs; and

- improve the level of state support for research through improved funding for infrastructure, such as facilities and equipment.

Faculty Survey and Administrators' Interview Results

Introduction

In 1992 Kansas became a National Science Foundation (NSF) EPSCoR (Experimental Program to Stimulate Competitive Research) state to improve its ability to compete for federal research and development (R&D) dollars. At that time, a plan was developed to assess progress in making Kansas more competitive for federal R&D dollars. Annual assessments of the status of science, engineering, and mathematics (SEM) research and infrastructure at the state's three Ph.D. granting institutions (the University of Kansas, Kansas State University and Wichita State University) have occurred since 1992. The sixth assessment (1997-98) includes three parts:

- Part I – Status of the SEM Infrastructure;
- Part II – Case Studies of Four Peer Institutions; and
- Part III – Faculty Survey and Administrators' Interviews.

The results of the SEM faculty survey and key administrators' interviews follow.

Faculty Survey

Procedures

In 1993 SEM faculty at Kansas State University (KSU), the University of Kansas (KU), and Wichita State University (WSU) were asked to comment upon problems and improvements in their capacity to compete for federal funds.[1] In 1997-98, a similar survey was administered to SEM faculty at the same three universities in order to determine the current status of barriers to research and development efforts and to determine if new barriers had arisen since 1993 (see **Appendix A** for the survey). This survey will be referred to as the 1997 survey because it represents the opinions and perceptions of SEM faculty through 1997.

Each university was asked to mail the surveys and an introductory letter to SEM faculty, as defined by previous NSF EPSCoR assessments, on its campus. A second mailing was sent one month later to improve survey participation. The respective universities assisted with the distribution and administration of the survey. The Office of the Associate Vice Provost for Research at KSU assisted with survey distribution to eligible faculty at KSU. Approximately 200 survey packets were distributed and 48 surveys were returned, for

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[1] Stella, M. Elizabeth, *Second Assessment of the Science, Engineering, and Math Infrastructure at Three Universities in Kansas: Response to Barriers to Research,* Institute for Public Policy and Business Research, the University of Kansas, Lawrence, June 1993, Report No. 207.

a response rate of 24 percent. The Institute for Public Policy and Business Research at KU distributed the survey to 633 SEM faculty; 227 surveys were returned, for a response rate of 36 percent. The Office of Research Administration at WSU mailed 156 surveys; 50 surveys were returned, for a response rate of 32 percent. A total of 325 surveys were analyzed.[2]

Those completing the 1997 survey had been at their university for an average of 14 years (range = 1 – 39 years). The average age of those participating was 48 years (range = 29 – 69 years). Tenured faculty comprised 67 percent of the participants, and 80 percent of the participants were male (**Table 1**). In 1993 the average number of years they were employed at their university was 13 (range = 1 – 46 years) while the average age of the participants was 47 years. Tenured faculty comprised 66 percent of those surveyed and 84 percent were male. **Table 1** presents other characteristics of those participating in both the 1993 and 1997 surveys and shows similar percentages for tenured faculty, department chairs, university administrators, and professional staff.

The following section will discuss the results of the 1997 survey and make comparisons where possible with the 1993 survey results.[3]

Results

The results of the survey represent faculty perceptions and descriptions of conditions as they existed through 1997 with regards to
- grant activity,
- rewards,
- grant development support,
- research equipment,
- research facilities,
- technical support and services,
- personnel (faculty and graduate students),
- barriers to research, and
- EPSCoR process.

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[2] Please note that 227 of the 325 surveys analyzed, or 70 percent, came from KU faculty.

[3] Different sampling techniques were employed in 1997 than in 1993, which employed a random sampling technique. A random sample of 742 was drawn from SEM faculty, academic staff and administrators (KSU = 269; KU = 313; and WSU = 160). Approximately one to two weeks after the survey was mailed, a phone call was made to those who had not returned the survey asking them to please complete it. The overall response rate was 55 percent (408 of 742 returned), with a return rate of 58 percent for KU, 55 percent for KSU, and 49 percent for WSU. **Given the different sampling technique and the lower response rates received in 1997, caution must be exhibited in interpreting any comparative analyses.**

Table 1
Demographic Information:
Description of Survey Population, 1993 and 1997

	1993	1997
Non-tenured faculty	26.2%	19.1%
Tenured faculty	65.9	67.0
Department Chair	8.1	8.0
University administrator	2.0	1.8
Academic	5.6	12.0
Professional	7.1	7.7
Other	1.5	2.8
Average age	47 years	48 years
Male	84%	80%
Female	16	20
Minority	9	12

Grant Activity

From July 1996 to early 1998, almost 78 percent of the science, engineering, and math (SEM) faculty surveyed reported submitting a grant proposal to external funding sources as a Principal Investigator (PI) or Co-PI (**Table 2-A**). The average number of proposals submitted by the respondents was 3.82. While KSU SEM faculty had the highest submission rate with almost 96 percent of their respondents, the number of proposals submitted per faculty was the lowest at 2.18 (**Table 2-A**). The percentage of faculty submitting proposals is higher in 1997 than it was in 1993 (**Table 2-B**).

Rewards

The 1992 assessment of barriers to research stated that "rewards, especially raises, were inadequate to motivate the extra work funded research requires."[4] Consequently, in the 1993 survey, faculty members were asked to rate how grant submissions and awards are rewarded relative to other duties during the merit review process. Faculty indicated that funded grants ranked second, just below publications, in their importance to the merit review process and grants submitted were ranked next to last.

> In 1992, rewards, especially raises, were inadequate to motivate the extra work funded research requires.

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[4] Stella, M. Elizabeth, *Assessment of Science and Engineering Infrastructure at Three Universities in Kansas: Identification of Weaknesses and Barriers to Research*, Institute for Public Policy and Business Research, the University of Kansas, Lawrence, March 1992, Report No. 195.

Table 2-A
Grant Activity:
Percentage Submitting Proposals, 1997 survey

		As a PI or Co-PI	Other Proposals
KSU		95.8%	25.0%
	Mean	2.18	1.94
KU		74.0%	29.5%
	Mean	3.58	1.81
WSU		78.0%	34.0%
	Mean	3.86	2.31
TOTAL		77.9%	29.5%
	Mean	3.82	1.90

Table 2-B
Grant Activity:
Percentage of Faculty Submitting Proposals as a P.I.,
1993 and 1997

	1993	1997
KSU	72.3%	95.8%
KU	67.2	74.0
WSU	65.4	78.0
TOTAL	68.7	77.9

The question was posed differently for the 1997 survey with faculty asked to rank the importance of research, teaching, and service (1=most important) to the department in the merit review process and then rank within those areas various subcategories (**Table 3**). Research received the highest mean at 1.14, followed by teaching and then service. Within research, publication was considered most important, followed by grants funded and then grants submitted. Undergraduate teaching was ranked higher than graduate teaching and internal service was ranked higher than external service.

> Grant submission efforts are not recognized in the merit review process in a way that increases the number of submissions.

The 1993 assessment also indicated that faculty felt that submitting grants had a low rank during the merit review process. It was surmised that "this perception of low reward for grants submitted may negate administrative directives that instruct faculty and staff to increase the number of grants submitted in order to increase the amount of external funding generated in their department or research unit." The 1997 survey results indicate that faculty perception may still be negating administrative directives. It may still be true that grant submission efforts are not recognized in the merit review process in a way that increases the number of submissions. At the department level, publications continue to receive the greatest emphasis with regard to merit review (**Table 3**).

Table 3
Rewards: SEM Faculty Perception of
Merit Review at the Departmental Level,
Mean Level of Importance, 1997
(1 = most important; 3 = least important)

Rank		Mean
1	Research	1.14
2	Teaching	1.99
3	Service	2.86
	Research Subcategories	
1	Publications	1.56
2	Grants Funded	1.75
3	Grants Submitted	2.67
	Teaching Subcategories	
1	Undergraduate	1.18
2	Graduate	1.80
	Service Subcategories	
1	Internal	1.47
2	External	1.65

When hiring faculty at the departmental level, faculty members were asked to rank the level of importance for six categories. Publication potential or success received the highest mean rank at 1.96 and was followed by grants funding potential or success at 2.16 (**Table 4**). The rankings found in **Table 4** are consistent with those in **Table 3** — research is considered more important than teaching, which ranks higher than service.

Research is considered more important than teaching, which ranks higher than service.

Table 4
Rewards: SEM Faculty Perception of Hiring Faculty at the Departmental Level, Mean Level of Importance, 1997
(1 = most important; 6 = least important)

Rank		Mean
1	Publication potential or success	1.96
2	Grants funding potential or success	2.16
3	Undergraduate teaching	3.00
4	Graduate teaching	3.36
5	Cost of start-up	4.61
6	Service	5.35

Grant Development Support

As funding levels decrease, competition for grants increase. To be successful, Kansas' universities need to help individual researchers and departments minimize the routine aspects of grant writing. This keeps the rates of grant submissions high and enhances the frequency of success. Almost 69 percent of those surveyed indicated that they received support for grant development (**Table 5**). This percentage is lower than the 1993 survey, which had 75 percent of the SEM faculty indicating that they received some form of support or assistance during grant development.

To improve success, Kansas' universities need to help researchers minimize the routine aspects of grant writing.

Table 5
Grant Development Support:
Principle Source, 1997

	KSU	KU	WSU	TOTAL
Received support	87.5%	65.2%	68.0%	68.9%
N =	*48*	*227*	*50*	*325*
Principle source of support:				
Department	50.0%	32.5%	30.6%	35.2%
University research/				
grants office	45.0	29.9	66.7	38.2
Other[5]	5.0	37.6	2.8	26.6
N =	*40*	*157*	*36*	*233*

Over half of the faculty participating in the 1997 survey indicated that they received support for budget development (57.9 percent) and grant administration (55.4 percent) (**Table 6**). Support for photocopying, information/networking and preparation of routine parts of a grant are services that are also available to many, but not all, faculty. When comparing the 1993 survey results with the 1997 results, it appears that improvement is still needed in the area of grant development support and that progress has been slow.

> It appears that improvement is still needed in the area of grant development support and that progress has been slow.

> Expectations in Kansas are low for grant services and support.

A comparison of responses for support "received" with support "like to receive" shows that most faculty appear to be receiving the services that they would like to receive (**Table 7**). Preparation of routine parts and mentoring had a higher percentage of faculty indicating that they would like to receive support than are receiving it.

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[5] Many (25) respondents from KU who marked "other" indicated CRINC (Center for Research, Inc.). Others (18) indicated units such as IPPBR, Life Span Institute and Higuchi. Clearly, they do not see CRINC as part of the University and they do not view IPPBR, LSI & Higuchi as departments. Several (2) respondents indicated they use both department and university services. This explains the discrepancy in numbers between KU, KSU, and WSU.

The case study analysis for the sixth assessment identified two levels of grant development services: core and innovative.[6] The services listed in **Table 7** would all be categorized as core services – those basic services that should be provided by a grant service office. Interestingly, a majority of the Kansas SEM faculty surveyed did *not* indicate that they would like to receive these core services. This can be explained through several possible scenarios. First, Kansas' faculty members are accustomed to doing these services by themselves and therefore expectation for assistance is low. Second, the value of these services has not been made clear to Kansas' faculty. Or, third, they do not want the services in the context they have been accustomed to receiving them. Whatever the scenario, the results indicate that improvement is still needed in both service provision and expectation.

Faculty members were asked to describe the level of grant development/administration support received for the past five years. Around 57 percent of the SEM faculty surveyed in 1997 describe "no change" in the level of grant support that they have received for the last five years (**Table 8**). Almost 10 percent said that support has decreased. Only 24 percent indicated that support had increased.

> Over half describe "no change" in the level of grant support received for the past five years.

Another measure of support for research and grant development is the availability of seed grants to support pilot research. Seventeen percent of those surveyed did *not* know if seed grants were available (**Table 8**). Only 4.5 percent indicated that it was easily obtained.

The frequency of contact with funding agencies is considered critical to the success of obtaining grant funding. Around 31 percent of those surveyed responded that they have had none to one contact with a funding agency in the last five years (**Table 8**). On the positive side, over half of the faculty (59.4 percent) indicated that they maintained annual or semester contact with funding agencies.

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[6] Krider, Charles E. and Genna M. Ott, *Sixth Assessment of the Science, Math and Engineering Infrastructure at Three Universities in Kansas: Case Studies of Four Peer Institutions,* Institute for Public Policy and Business Research, the University of Kansas, Lawrence, June 1998, Report No. 247.

Table 6
Grant Development Support:
Percent of Faculty Receiving Support, 1993 and 1997

Rank	Type	1993	1997
1	Budget development	55.4%	57.8%
2	Grant administration	41.9	55.4
3	Photocopying	44.4	46.8
4	Information/networking (funding sources, etc.)	45.8	43.1
5	Preparation of routine parts	26.5	40.9
6	Word processing	37.3	25.5
7	Mentoring (help with planning/writing grant)	20.3	17.5
8	Other	4.7	3.1

Table 7
Grant Development Support:
Received vs. Like to Receive, 1997

Support	Received	Like to Receive
Budget development	57.8%	44.9%
Grant administration	55.4	36.0
Photocopying	46.8	42.8
Information networking	43.1	42.8
Preparation of routine parts	40.9	48.6
Word Processing	25.5	23.1
Mentoring	17.5	29.5
Other[7]	3.1	9.8

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[7] KU respondents wanted assistance with travel to the funding source. All groups of respondents frequently mentioned assistance with editing and proofreading (including technical) was desirable.

Table 8
Grant Development Support:
Level of Support, 1997

	KSU	KU	WSU	TOTAL
Description for last 5 years:				
Decreasing	12.8%	9.8%	6.5%	9.7%
No change	51.1	58.6	56.5	57.1
Increasing	29.8	21.4	28.3	23.7
Don't Know	6.4	10.2	8.7	9.4
N =	*47*	*215*	*46*	*308*
Availability of seed grants to support pilot research:				
1 = not available	17.0%	6.4%	15.6%	9.3%
2	25.5	27.7	20.0	26.3
3	29.8	26.8	22.2	26.6
4	12.8	16.4	20.0	16.3
5 = easily obtained	0.0	4.5	8.9	4.5
6 = Don't know	14.6	18.2	13.3	17.0
N =	*47*	*220*	*45*	*312*
Frequency of contact with funding agencies:				
None in last 5 years	17.4%	16.4%	20.8%	17.2
Once every 3-5 years	15.2	14.0	12.5	14.0
Every 2 years	10.9	9.3	8.3	9.4
Once a year	37.0	24.8	29.2	27.3
Once a semester	19.6	35.5	29.2	32.1
N =	*46*	*214*	*48*	*308*

Research Equipment

In the first assessment (1992) conducted regarding the SEM infrastructure in Kansas, new faculty reported inadequate start-up equipment and established faculty often reported the lack of funds to repair, replace, and expand equipment. Agencies do not fund requests for equipment, which then traps faculty in the cycle of needing equipment to be competitive but not having funds to obtain and maintain equipment. The 1993 faculty survey concluded that equipment continued to be an area of concern. The 1997 survey results show that this is still true.

> Equipment continues to be an area of concern.

> Research equipment is "adequate—for yesterday's research, maybe today's, but not for tomorrow's."

Eighty-seven percent of the faculty said that they require equipment to conduct their research (**Table 9-A**). Around 44 percent of the faculty indicated that their equipment was "adequate" and another 28 percent said that their equipment was "competitive" to "state of the art." Still a large number (30.6 percent) responded that the condition of research equipment was "old, obsolete, unreliable" or "not available." One person describes the condition of research equipment as: "adequate—for yesterday's research, maybe today's, but not for tomorrow's."

Table 9-A
Research Equipment:
Use and Condition, 1997

	KSU	KU	WSU	TOTAL
Require equipment to conduct research:	87.2%	87.2%	85.7%	87.0%
N =	*47*	*226*	*49*	*322*
Condition of Equipment:				
Not available	14.6%	8.9%	14.0%	10.5%
Old, obsolete, unreliable	12.5	20.9	24.0	20.1
Adequate	43.8	44.0	46.0	44.3
Competitive	18.8	24.4	16.0	22.3
State of the art	4.2	5.8	4.0	5.3
N =	*48*	*225*	*50*	*323*

Table 9-B
Research Equipment: Condition, 1993 and 1997

	1993	1997
Condition		
Not available	7.4%	10.5%
Old, obsolete, unreliable	13.6	20.1
Adequate*	57.1	44.3
Competitive	15.7	22.3
State of the Art	6.2	5.3
N =	*408*	*323*

*1993 "Adequate" includes "adequate but soon obsolete/inadequate".

A comparison with the 1993 survey suggests that the condition of research equipment may have declined in the past five years (**Table 9-B**). Almost 31 percent of the respondents in 1997 said that equipment was "old, obsolete, unreliable" or "not available" compared with 20 percent in 1993.

Faculty were asked their perceptions about funding for repair, replacement, and expansion of equipment, the effect of the condition of equipment on ability to obtain grant funding, and the difficulty with purchasing regulations for equipment. A substantial number of the faculty (61.8 percent) felt that funding for equipment was inadequate or not available (**Table 10**). Approximately 23 percent felt that the condition of equipment had a negative effect on their ability to obtain grant funding. Almost half of the faculty (48.1 percent) experienced difficulty with purchasing regulations for equipment. Continual assessment of and investment in equipment must remain a priority to improve those areas where condition of equipment impedes ability to obtain external funding and to replace equipment that will soon become obsolete or inadequate.

> The condition of equipment has a negative impact on ability to obtain grant funding.

Research Facilities

> The condition of research facilities is considered adequate.

SEM faculty were asked to about the condition of research facilities with an "1" response indicating "not adequate" and a "5" response being "state of the art." The mean response was 2.98 (**Table 11**). In 1993, the engineering faculty's rating of the adequacy of facilities was significantly lower than math and science faculty's. In 1997, no significance difference was found in the responses between engineers and scientists/mathematicians. In general, the responses show that research facilities are merely adequate. These conditions are similar to the conditions that existed in 1993 (**Table 11**).

Table 10
Research Equipment: Status, 1997

	KSU	KU	WSU	TOTAL
Funding for repair, replacement and expansion:				
1 = Not available	24.4%	21.1%	27.9%	22.6%
2	24.4	41.2	44.2	39.2
3	31.7	18.6	16.3	20.1
4	9.8	10.1	4.7	9.2
5 = Always available	0.0	2.5	0.0	1.8
6 = Don't know	9.8	6.5	7.0	7.1
N =	*41*	*199*	*43*	*283*
Effect on ability to obtain grant funding:				
1 = Prevents	2.4%	6.2%	9.8%	6.2%
2	14.6	13.4	31.7	16.3
3	43.9	49.5	39.0	47.1
4	34.1	20.1	14.6	21.4
5 = Provides competitive edge	4.9	10.8	4.9	9.1
N =	*41*	*194*	*41*	*276*
Difficulty with purchasing regulations:				
1 = Extremely difficult	13.0%	18.0%	14.6%	16.8%
2	37.0	27.9	41.7	31.3
3	21.7	23.4	20.8	22.8
4	15.2	13.5	10.4	13.3
5 = Extremely easy	0.0	3.6	2.1	2.8
6 = Don't know	13.0	13.5	10.4	13.0
N =	*46*	*222*	*48*	*316*

Table 11
Research Facilities: Condition, 1993 and 1997

	1993 Adequacy* Mean	1997 Adequacy* Mean
KSU	3.6	2.96
KU	3.1	3.03
WSU	2.9	2.77
TOTAL	3.1	2.98
Engineers	2.8	3.10
Math/Science	3.1	2.96

*1 = not adequate; 5 = state of the art
No significant difference in response found between Engineers and Math/Science for 1997.

Technical Support and Services

The need, availability and adequacy of technical support and services at the university level were sought in the 1997 survey. A little over 73 percent of those responding to the survey indicated that they need some form of technical support and services to conduct their research (**Table 12**). This is

> Availability and adequacy of technical support and services for research needs improvement.

similar to the response in 1993, which had 70 percent of the faculty indicating a need for technical support and services. Written comments to the 1997 survey indicated that computer-related technical support was lacking for all institutions.

The 1993 assessment found that technical support and services continued to be a barrier for research. While the availability (2.79) and adequacy means (2.85) for technical support and services shows a neutral position, a closer look at percentage breakdowns for responses suggests that technical support and services is still a barrier to research (**Tables 12 and 13**). In 1997, a large percentage (41 percent and 36 percent, respectively) of those surveyed indicated that support was not available and that the level of support was not adequate (**Table 12**).

Table 12
Technical Support and Services:
Need, Availability, and Adequacy, 1997

	KSU	KU	WSU	TOTAL
Need some form of technical support:	39	65	34	238
	81.3%	72.7%	68.0%	73.2%
Availability of support:				
1 = Not available	15.4%	13.9%	32.4%	16.7%
2	30.8	20.5	35.3	24.3
3	28.2	30.7	17.6	28.5
4	20.5	28.3	11.8	24.7
5 = Always available	5.1	6.6	2.9	5.9
N =	*39*	*166*	*34*	*239*
Adequacy of support:				
1 = Very poor	7.5%	10.0%	16.7%	10.6%
2	27.5	22.4	41.7	26.0
3 = Adequate	45.0	34.1	33.3	35.8
4	20.0	28.2	2.8	23.2
5 = Supports cutting edge research	0.0	5.3	5.6	4.5
N =	*40*	*170*	*36*	*246*

Table 13
Technical Support and Services:
Availability and Adequacy, 1993 and 1997

	1993		1997	
	Availability* Mean	Adequacy** Mean	Availability* Mean	Adequacy** Mean
KSU	2.8	2.8	2.69	2.78
KU	3.2	3.2	2.93	2.96
WSU	2.7	2.6	2.18	2.39
TOTAL	2.9	2.9	2.79	2.85
Engineers	2.5	2.4	2.73	2.67
Math/Science	3.0	3.0	2.80	2.89

*1 = not available; 5 = always available
**1 = not adequate; 5 = supports cutting edge research
No significant difference in response found between Engineers and Math/Science for 1997.

Personnel

Graduate Students. The foundation of a successful research program is graduate education, especially at the doctoral and postdoctoral levels. The number of students directed in research projects ranges averages 2.49 at the pre-doctoral level and 1.85 at the postdoctoral level (**Table 14**). The average number of postdoctoral students funded through research grants is 0.96. On a 1 to 5 scale with 1=very poor and 5=excellent, the ability to recruit mean is 2.70 and the quality of recruits mean is 3.18 (**Table 15**). Engineering faculty report a slightly lower mean that the math and science faculty. The ability to recruit and the quality of graduate students has declined slightly from 1993.

Various barriers to graduate student recruitment were listed in the survey and respondents were asked if this was true for their department. The greatest barrier was found to be lack of funding followed by noncompetitive salaries (**Table 16**). These were the top two barriers in 1993 as well. It does appear, however, that the funding situation is improving with fewer faculty members in 1997 responding that this was a barrier compared with 1993.

> Funding and competitive salaries are needed to improve graduate student recruitment.

Table 14
Personnel: Student Research Assistance, 1997

	Average	Mode	Range	*N=*
Number of Students directed in research projects:				
Undergraduate	2.57	1	0 – 32	*175*
Master	2.58	1	0 – 15	*172*
Pre-doctoral	2.49	1	1 – 15	*198*
Post doctoral	1.85	1	0 – 11	*80*
Funded through research grants:				
Graduate	2.32	0	0 – 12	*236*
Post doctoral	0.96	0	1 – 10	*136*

Table 15
Personnel: Availability and Quality of Graduate Students, 1993 and 1997

	1993		1997	
Group	**Ability to Recruit* Mean**	**Quality of Recruits* Mean**	**Ability to Recruit* Mean**	**Quality of Recruits* Mean**
KSU	2.8	3.3	2.26	2.86
KU	3.2	3.5	2.87	3.29
WSU	3.0	3.2	2.35	2.98
TOTAL	3.0	3.4	2.70	3.18
Engineers	2.7	3.2	2.31	3.07
Math/Science	3.1	3.4	2.79	3.20

*1 = very poor; 5 = excellent
No significant difference in response found between Engineers and Math/Science for 1997.

Table 16
Personnel: Barriers to Graduate
Student Recruitment, 1993 and 1997

Rank	Barrier	1993	1997
1	Lack of funding	55.1%	45.8%
2	Noncompetitive salaries	43.4	42.8
3	No fee waivers for research assistants	29.9	39.7
4	Departmental reputation	18.9	20.6
5	Other[8]	10.8	17.8
6	Lack of industrial base in Kansas	7.1	7.4

> Equal emphasis is placed at the departmental level on undergraduate and graduate education.

Another influence on graduate personnel is the emphasis that is placed at the departmental level on undergraduate versus graduate education. It appears that an equal emphasis is place on undergraduate and graduate education with a mean emphasis for all three universities of 3.05 on a 5-point scale (**Table 17**). Engineering has a slightly greater emphasis on undergraduate education compared to science and math.

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[8] English language requirements for foreign students, changes in tuition residency requirement interpretation (KU), and geographic locations were all frequently cited as barriers. Another popular response cited the inability to commit positions to students in a timely manner due to tardiness of state budget information (KU) and inability to commit to students before arrival (WSU). KU respondents often discussed the lack of adequate publicity and recruitment efforts as problematic. "We have much to offer, but no one knows it," a KU respondent said.

Table 17
Personnel: Departmental Undergraduate and Graduate
Education Emphasis, 1993 and 1997

	1993 Mean*	1997 Mean*
KSU	3.5	2.83
KU	3.1	3.20
WSU	2.9	2.62
TOTAL	3.2	3.05
		**
Engineers	2.8	2.49
Math/Science	3.4	3.18

*1 = undergraduate emphasis; 5 = graduate emphasis
*Significant difference found in the response between Engineers and Math/Science. The probability that this would have occurred through strictly random variation is less than 1 time out of 100.

Faculty. The 1993 assessment stated that the ability to recruit senior faculty who are excellent teachers and nationally recognized research scientists continues to be difficult. The ability to recruit and retain nationally recognized faculty leans towards the positive side in

> The greatest barrier to faculty recruitment and retention is faculty salary.

1997 with means of 3.21 and 3.13, respectively (**Table 18**). Several KU respondents reported that their departments are not interested in a candidate's teaching ability, but rather in their scientific and research ability. The ability to recruit and the ability to retain means are slightly higher in 1997 than they were in 1993, indicating that some improvement may be occurring.

Table 18
Personnel: Recruitment and Retention of
Nationally Recognized Faculty, 1993 and 1997

	1993		1997	
	Ability to Recruit* Mean	Ability to Retain* Mean	Ability to Recruit* Mean	Ability to Retain* Mean
KSU	2.6	2.8	3.09	2.52
KU	3.2	3.3	3.39	3.36
WSU	2.5	2.6	2.56	2.68
TOTAL	2.8	3.0	3.21	3.13
			**	
Engineers	2.2	2.6	2.72	2.88
Math/Science	3.0	3.1	3.33	3.19

*1 = poor; 5 = excellent
**Significant difference found in the Ability to Recruit response between Engineers and Math/Science. The probability that this would have occurred through strictly random variation is less than 1 time out of 100.*

Various barriers to faculty recruitment and retention were listed in the survey. Easily the greatest barrier is faculty salary with over 62 percent of those surveyed responding that this was a barrier (**Table 19**). This was the same situation is 1993. One respondent

> Improvement has been shown in start-up packages for new faculty.

related that initial salaries are competitive, but that subsequent raises fall short of other institutions. Improvement has been shown in start-up packages for new faculty. Otherwise, most of the barriers listed in 1993 continue to be barriers in 1997 with little indication that improvement has been achieved with regards to barriers.

Table 19
Personnel: Barriers to Faculty
Recruitment and Retention, 1993 and 1997

Rank	Barriers	1993	1997
1	Salaries	62.3%	62.2%
2	Inadequate start-up packages for new faculty	37.0	27.4
3	Teaching loads	22.5	26.2
4	Inadequate facilities	21.8	26.2
5	Inadequate support services	18.9	19.4
6	Inadequate equipment	17.6	17.5
7	Departmental reputation	16.7	15.4
8	Other[9]	11.3	13.5
9	Overhead distribution policies	7.8	9.2

> Three-fourths indicated that they were currently involved in a collaborative research project.

SEM faculty members were also surveyed as to their involvement in collaborative/team research projects, which may offer advantages when seeking research funding. Almost 75 percent indicated that they were currently involved in a collaborative research project (**Table 20**). The most frequently described collaborative project was one that involved faculty outside the department (42.8 percent). Those projects that involve faculty at out of state institutions were also mentioned by more than one-third of the respondents (39.7 percent). In 1993, 78 percent of SEM faculty reported that they were currently involved in collaborative/team research projects, with collaboration across departments (60.8 percent) and within departments (50.2 percent) being the mostly frequently mentioned forms of collaboration.

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[9] Many faculty indicated that the location in Kansas and/or small town was a major problem. One KU respondent stated, "We are in Kansas, [it's] not perceived as a cutting edge place." Related to that issue was the inability of spouses to find adequate professional employment in the region and/or lack of provisions at the institution for the spouse.

Table 20
Personnel: Involvement in Collaborative/
Team Research Projects, 1997

	KSU	KU	WSU	TOTAL
Currently involved in a collaborative research project:	91.5%	70.9%	78.0%	74.8%
N=	*48*	*227*	*50*	*325*
Description of project:				
Involves faculty —				
Within department only	39.6%	23.8%	36.0%	28.0%
Outside department	50.0	43.6	32.0	42.8
On different campuses within the state	20.8	17.2	26.0	19.1
At out-of-state institutions	47.9	38.8	36.0	39.7
Other[10]	6.3	6.6	6.0	6.5

Barriers to Research

In 1993, faculty were given a checklist of barriers and asked to identify the biggest barrier to research productivity and external funding. Thirty-five percent of those surveyed identified the degree of support given to the research mission as the biggest barrier to research productivity and external funding. The next most frequently marked barrier was infrastructure—physical, human (26 percent), which was followed by limited funding (18 percent). As seen by the 1997 survey results, these barriers still exist five years later (**Table 21**).

> Barriers to Research
> 1. Competing Demands on Time—Faculty Obligations of Teaching, Administration, Service
> 2. Inadequate Infrastructure—Equipment and Facilities
> 3. Quality of and Funding for Graduate Students
> 4. Limited Funds Available
> 5. Lack of Technical Support Personnel University's Reputation for Research (tie)

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[10] The majority of "other" respondents cited international and consultant/industry research.

Table 21
Barriers to Research Productivity
and External Funding, 1997

Number of Responses

Barrier	KU	KSU	WSU	Total	Percent of Total[11]
Obligations on Faculty— teaching loads/ administrative/service	59	8	15	**82**	**33.3%**
Infrastructure—facilities, equipment, libraries	31	9	5	**45**	**18.3**
Graduate Students—post-docs, RA's, TA's and funding, quality, and quantity	28	10	5	**43**	**17.5**
Funding Availability—for type of research, seed, bridge	27	6	2	**35**	**14.2**
Time (general)	21	7	2	**30**	**12.2**
Technical Support Personnel	13	4	5	**22**	**8.9**
Reputation for Research—not competitive	11	2	7	**22**	**8.9**
University Administration Support and Understanding of Research	13	3	5	**21**	**8.5**
Attitude—administration and faculty	11	2	1	**14**	**5.7**
Incentive System—salaries and rewards	10	2	2	**14**	**5.7**
Grant Development Support	10	0	1	**11**	**4.5**
Faculty Personnel—critical mass and expertise	7	1	0	**8**	**3.3**
Departmental Support	3	0	2	**5**	**2.0**
Midwest Location	3	0	0	**3**	**1.2**
N=	*174*	*37*	*35*	***246***	
Percent of Total Respondents	*76.7%*	*70.1%*	*70.0%*	***75.7%***	

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[11] About 76 percent of the 325 surveys returned had responses to the research barrier question. The percent of total in **Table 21** refers to *N=246*.

In the 1997 survey, the research barrier question was asked in an open-ended format—no checklist was given. A quantitative summary of those responses is given in **Table 21**. One-third of the respondents to the barrier question named faculty obligations (most frequently teaching loads) and not having enough time to meet all those obligations as the biggest barrier to research productivity and external funding.

SEM faculty members are frustrated as they try to meet the various demands placed upon their time: "Teaching loads are not comparable to top research institutions. Standard load should be three (3) courses per year. This is what our competitors have." The comments go on and discuss that the result of all the demands—research, teaching, administration, service, committee work—is that something will suffer. "You can't do everything excellently in an 80 hour work week if you teach two courses a semester." They believe that their time is split between too many conflicting responsibilities. Researchers end up spending an inordinate amount of time on administration, budgets, paperwork, and committee assignments. It was argued that research is not emphasized or valued at the departmental or university level and, therefore, researchers are given "service" assignments that decrease research productivity.

Overall, faculty expressed anxiety over the amount of responsibility placed on them and the time required for meeting their responsibilities. One respondent described it as "The vicious cycle: research funding—recruit graduate students—obtain equipment—perform research, publish, attend conferences—recognition—research funding…"

The next most frequently talked about barrier (18 percent) was infrastructure, which included equipment and facilities (**Table 21**). This barrier was described as "…a lack of investment in infrastructure, at all levels. This includes: research space, equipment, technical support services, funds available to maintain, upgrade, and replace equipment to maintain state-of-the-art activities."

Faculty respondents felt the ability to attract and retain high quality graduate students was critical to research productivity. Graduate student assistance was named as a barrier to research by almost 18 percent of the respondents to the barrier question (**Table 21**). Post-doctoral positions, research assistants, and teaching assistants all fell under this category as well as discussion about the lack of quality, quantity, and funding.

Funding is another major barrier to research and external support (**Table 21**). A number of respondents mentioned that the nature of the research they are engaged in may not be very fundable, which made external funding difficult. The responses also discussed the need for funding for seed and bridge purposes to develop research areas and make proposals for external funding more competitive.

Technical research personnel support was mentioned by almost 9 percent (**Table 21**).[12] The respondents felt that quality technical support personnel would improve research productivity. The responses indicated that funding and support for this was lacking.

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[12] This response was categorized as an infrastructure issue in the 1993 survey.

The research reputation of the university or department and the researcher's ability to be competitive was mentioned by almost 9 percent of the respondents to research barriers (**Table 21**). Several respondents mentioned that the mid-west location kept them from being competitive for grants.

The lack of support by university administrators and the attitude of administrators and faculty members were two other barriers to research that were mentioned (**Table 21**). One respondent felt that the university administration did not understand the requirements of science and technology research. Another felt that "Individually, faculty are regarded as competitive potential 'overhead producers.' Hardly anything is done to build research programs for groups of less than 'star' individual researchers. It's very easy for an isolated faculty member to slide out of competitiveness and fail individually."

Fourteen respondents cited that there is no monetary incentive to seek external funding. "I have brought in enough external funding to pay my salary for the next 30 – 35 years. There is no mechanism for me to receive a special raise for these actions. Thus, if I have to spend 30 hours on teaching and service, why bother to bring in external funds just so I can work 60 hours per week for no money."

EPSCoR Process

Benefits. The respondents that have received EPSCoR funding were asked to describe any positive or beneficial outcomes of the EPSCoR process that they had seen or experienced.[13] Eighty-four respondents, or 67 percent of the respondents receiving EPSCoR funds, discussed the benefits of the EPSCoR program.[14] A summary of their responses is listed in **Table 22**.

> **Benefits of EPSCoR**
> 1. Increased collaboration between Kansas institutions
> 2. Provided seed money to get more federal funding (tie)
> 3. Brought equipment and facilities to an adequate level
> 4. Elevated research to an international competitive standard
> 5. Improved funding for Graduate Students

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[13] The potential number of respondents receiving EPSCoR funds has been calculated at 126, from which 87, or 69 percent, have received NSF EPSCoR funds.

[14] Responses were not limited to NSF EPSCoR but may also include experience with other federal EPSCoR programs, such as NASA, POD, EPA, DOE, and NIH.

Table 22
Benefits Received through EPSCoR, 1997

	Number of Responses				
	KU	**KSU**	**WSU**	**Total**	**Percent of Total[15]**
Benefits					
Increased collaboration within the university and among universities	16	3	1	**20**	**15.9%**
Provided seed funding—allowed to move into a new research area, led to larger grants	10	7	3	**20**	**15.9**
Funded and improved infrastructure—equipment and facilities	10	1	5	**16**	**12.7**
Elevated research and improved visibility for the research	7	4	4	**15**	**11.9**
Provided funding for graduate student support	5	4	4	**13**	**10.3**
Assisted with faculty development, particularly junior faculty/provided mentors	7	3	2	**12**	**9.5**
Provided the basics—supplies, travel funds	7	1	2	**10**	**7.9**
Kept research going—provided bridge funding	5	0	0	**5**	**4.0**
Assisted with grant development and preparation	4	0	0	**4**	**3.2**
Provided technician support	3	1	0	**4**	**3.2**
N=Number Responding Received EPSCoR Funding	*76*	*27*	*23*	***126***	

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[15] Total used to calculate percent = 126.

> Overall, EPSCoR
> is a very positive
> program.

Increased collaboration and seed money were the two most frequently mentioned benefits (16 percent each) of EPSCoR (**Table 22**). The increased number of collaborations between Kansas institutions and faculty was appreciated. "NSF EPSCoR has increased collaborations between K-State, KU and Wichita State in Chemistry and increased the number of joint proposals to other agencies." The result of seed money for some was one or more federal grants. "[The] NSF-EPSCoR First Award and travel fund were key to my obtaining a CAREER Award."

Sixteen respondents said that infrastructure improved as a result of EPSCoR funds (**Table 22**). The EPSCoR seed money helped bring their equipment to an adequate level for research, and some used EPSCoR funds to hire graduate students and post-docs.

EPSCoR was also credited with assisting with faculty development (9.5 percent) through seed funds and mentoring. The value of EPSCoR for junior faculty was seen as significant. "Overall, EPSCoR is a very positive program as it has allowed me to establish my research at a level which would not otherwise be possible. Most importantly, it has forced the state of Kansas to provide faculty and universities with the support they should be funding."

EPSCoR funds have also allowed for research to keep going when other funding options have failed. It has provided the basics (such as supplies and travel), served as bridge funding, assisted with grant development and preparation for larger projects, and provided technical support. EPSCoR has been credited with bringing research up to an internationally competitive standard. Overall, EPSCoR has been a very positive program. As one respondent stated, "It's the only thing that has saved me. Technician support let me spend time on papers and proposals rather than doing routine lab duties—and still continue to get preliminary data. I also got advice from EPSCoR mentors."

Areas of Concern. Respondents were also asked to describe any problems, complications, or negative impacts of the EPSCoR program. Forty-three surveys, or 34 percent of the potential respondents,[16] had responses to this open-ended question (**Table 23**). Frustrations with EPSCoR were concentrated in three major areas: paperwork/reporting requirements, budget periods, and the review and selection process.

> Frustrations with EPSCoR
> 1. Paperwork/reporting requirements
> 2. Budget periods
> 3. Review and selection process

Thirteen respondents (or 10 percent) focused on the paperwork and reporting requirements associated with EPSCoR (**Table 23**). Many related that the reporting deadlines were abrupt, reporting requirements changed frequently and were burdensome in number and size.

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[16] Potential respondents refer to those respondents who have received EPSCoR funds, the number of whom were calculated at 126, of whom 87, or 69 percent, have received NSF EPSCoR funds.

Table 23
Concerns with the EPSCoR Program, 1997

Number of Responses

Concerns	KU	KSU	WSU	Total	Percent of Total[17]
Paperwork/reporting requirements	5	3	5	**13**	**10.3%**
Budget periods	8	2	2	**12**	**9.5**
Review and selection process	4	3	0	**7**	**5.6**
Collaboration requirement	2	1	0	**3**	**2.4**
No negative comments— positive experience	6	3	2	**11**	**8.7**
N=Number Responding Received EPSCoR Funding	*76*	*27*	*23*	***126***	

Another frequent frustration with EPSCoR was the budget period, which was mentioned by 12 respondents (**Table 23**). One concern was that the delays in the availability of funds resulted in a 'rush' to spend-down the grant. "Every year the funding is delayed by up to three months (1/4 of the yearly funding period). Then we receive dire messages about how we should not leave moneys unspent at the end of the year." Budget periods were also described as short and several would like to see funding spread out over a longer budget period. "[It] would be nice to have funds guaranteed for 18 months to two years so that a long-term commitment can be made to hire a good post-doc. When given end of year support for 6-9 months, it is difficult to hire a badly needed post-doc."[18]

The third concern, which was mentioned by seven respondents, was the review and selection process (**Table 23**). Respondents were concerned that the selection of proposals was arbitrary and that members of the selection committee had an advantage over non-members. An example of a complaint was "EPSCoR grants were given to members of the

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[17] Total used to calculate percent = 126.

[18] The timeline of grant notification and budget periods is governed, unfortunately, by delays at the federal level. For example, the government shutdown in 1996 meant that K*STAR did not receive official budget approval until December for a start date of October. Thus, contractual agreements for projects at the participating institutions were not issued until early in 1997. This means a truncated period of less than a year to expend an intended one-year budget. The K*STAR director is urging NSF-EPSCoR to allow K*STAR to negotiate cooperative agreements over a longer time span so that budgets can be allocated and expended over a period of two or more years.

selection committee with outstanding funding records. Single investigator grants were funded where the PI already had substantial NSF funding." This perception may be keeping some faculty from submitting EPSCoR proposals, particularly at KU. These comments indicate that there is room for improving communication on how the process works.

According to K*STAR, decisions on all *major K*STAR programs* involves an *external review panel*. No one from Kansas participates on these panels. Written mail reviews from experts residing outside Kansas are often obtained in those cases in which K*STAR has advance knowledge that the panel cannot provide adequate review. Senior faculty from Kansas institutions along with external consultants have assisted the K*STAR Director in making selection decisions for the First Awards, travel grants, and the earlier Research Stimulation Initiative program. However, faculty members are not asked to review any proposals from their own institutions and in the case of panel reviews, are asked to leave the room during discussions to avoid "conflict-of-interest."

On the positive side, eleven respondents, or nine percent, felt that the experience was positive enough to respond that they had no negative comments in the negative comment section.

Other Comments and Concerns

> **Critical Areas of Concern**
> - EPSCoR Review Process
> - Support for Infrastructure
> - Faculty Workload

Survey respondents were also given the opportunity to describe other comments or concerns. The comments focused on three key areas: 1) the EPSCoR review process, 2) support for research infrastructure, and 3) faculty workload. Under the review process concern was expressed about using EPSCoR funds to support junior faculty and that the funding should not be used for senior faculty. Discussion on the faculty workload centered on establishing a balance between teaching and research in order to maintain quality education. Support for infrastructure was concerned with not only support from the University but also from the State of Kansas.

One of the respondents who was concerned about University infrastructure explained it as follows: "I believe that the chief difference between the University of Kansas and schools that are among the top in external grant support is chiefly the level of investment in research infrastructure and individual research programs. It is not realistic to expect that the funding gap can be closed solely as a result of individual effort by researchers. This will take the same kind of investment made at the top externally-funded institutions."

With regards to the time it takes to be a teacher and researcher, one respondent summarized the dilemma: "I do love to teach—but my competition teaches eight weeks a year, and I officially do three courses a year. Hard to stay up on the literature, let alone write and do experiments—if I do a good job in my courses."

The faculty would like to see more support and understanding at the University level for research. The following comment summarizes what is needed: "…I firmly believe that scholarship is best measured by quality publications, not by dollars earned in grants. Although I understand the other reasons for research dollars, I find it troublesome when faculty and programs are rated by the dollars they bring in and not by quality of peer reviewed science. In my field, good science can be done cheaply and some of the biggest grants do not lead to creative science. The biggest effect that KU could have on research productivity and eventually research dollars is funds for pilot studies—even quite small amounts to hire undergraduate help would have a big impact for me and many others." From this statement, it could be argued that faculty are not thinking big enough—aspirations may be too small to get those large, collaborative grants that are now in funding favor.

Key Findings – Faculty Survey

While some institutional changes are being made – as described in the next section – the results of the faculty survey indicate many of the major institutional changes that were needed in 1993 are still needed today. The faculty survey indicated that:

- Research is considered more important than teaching, which ranks higher than service. Within research, publication was considered more important, followed by grants funded and then grants submitted. Therefore, researchers who can produce results with little or no external funding rationally bypass grant seeking.

- In Kansas, there is still a need for improved grant development and administration support services. Successful grant recipients are persistent, and successful universities minimize the effort individual researchers must expend upon the routine aspects of grant writing, particularly preparation of routine parts and monitoring. Expectations for grant assistance and services appear to be low.

- The condition of research equipment may have declined in the past five years with 31 percent of the 1997 respondents categorizing equipment as "old, obsolete, unreliable" or "not available" compared with 20 percent in 1993. Over 60 percent of the faculty felt that funding for equipment was inadequate or not available. Purchasing regulations continue to create difficulty for almost half of the faculty.

- In general, research facilities are merely adequate.

- The level of technical support and services is a barrier to research.

- Lack of funding, noncompetitive salaries, and no fee waivers for research assistants make it difficult to recruit top quality graduate students. Because any improvement in SEM research and grant activity is grounded in improving graduate education, the state's ability to recruit top quality graduate students must be a priority.

- Low faculty salaries continue to be a barrier to faculty recruitment and retention.

- The main barriers to research, as described by the respondents, are time to meet all the faculty obligations, infrastructure (equipment and facilities), graduate students (quality and funding), limited funding for research, technical support personnel, and the department's or university's reputation for research.

The EPSCoR program has had many positive benefits. It has increased collaboration between Kansas institutions, provided seed money for research, improved equipment and facilities, elevated research to a more competitive standard, and provided funding for graduate students. The results indicate frustration with the paperwork and reporting requirements, the budget periods, and the review and selection process for EPSCoR. However, overall, the survey results indicate that the program has helped and has had a positive effect on research in Kansas.

Administrators' Interviews

Procedures

Eighteen key administrators at KSU, KU, and WSU were interviewed during April and May of 1998 to determine what institutional responses had been made to previous assessments of barriers to research productivity and external funding. The interviews lasted 30 to 60 minutes and were conducted on-site.[19] Questions asked included:

1. How the administrators view the level of research activity;
2. What has been done to increase the level of funded research;
3. What barriers to research productivity and funding exist and how are they being addressed;
4. What changes have been made in how the university invests in and rewards research and grant activity; and,
5. How changes have been made in the way the university attracts and retains research and grant productive faculty.

The results of the administrative interviews follow and, where possible, comparisons are made with the 1993 administrative interviews.

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[19] Eight administrators were interviewed at WSU; Carlene Hill, director of the Center for Economic Development and Business Research (CEDBR) conducted the interviews. Five administrators at KU and five administrators at KSU were interviewed by Charles Krider, director of IPPBR. Genna Ott assisted with the interviews at KSU.

Results

Increase Research Level

University administrators agreed that a university's ability to recruit and retain top-level research faculty is the key to improvement in extramural funding. This requires competitive salaries, adequate infrastructure (equipment and facilities), and other research support for faculty.

> A university's ability to recruit and retain top-level research faculty is the key to improvement in extramural funding.

One KSU administrator discussed the recent research success of the Mechanical Engineering department and credited an increase in new hires to its success. The recent hires were the result of faculty retirements. New faculty members were hired with the expectation of extramural funding as a condition for tenure. This policy has quickly raised the department to be nationally competitive. At KU, an administrator talked about the national reputation of the School of Pharmacy and attributed the high level of funding to outstanding faculty – both individually and collectively. WSU administrators felt that the level of federal funding has improved and some attributed that to the willingness of the Office of Research Administration to do whatever can be done to support grant productive faculty.

To attract and retain quality faculty, the university must be willing to fund start-up costs for new hires and maintain better-than-adequate equipment and facilities. The central administration, the college, and the departments often share start-up costs. The involvement of Deans with start-up costs is a relatively new role and one that has been made possible through the return of research overhead to the academic units.

The increase in research capacity can also be tied to a greater emphasis on rewarding extramural funding in merit and promotion and tenure decisions. Universities have also increased collaborative efforts, which in turn increases the competitiveness of the research proposal.

In 1993, all three universities were working towards increasing research capacity. KSU reported focusing upon inter-disciplinary initiatives and cooperation among colleges and departments. Key administrators at KSU were developing more competitive and innovative recruitment programs for new faculty, including more competitive start-up packages and salaries.

Barriers to Research

The barriers to research in 1993 are not all that different from those mentioned in 1998. Similarities include concern with faculty (turnover and salaries), infrastructure (facilities and equipment), teaching loads, and a supportive university culture. In 1993, WSU administrators also expressed concern with growth and development of faculty and having that critical mass necessary for research to truly flourish. At KU, administrators were concerned with the challenge of fulfilling the University's mission of teaching (undergraduate and graduate) and research given the large undergraduate enrollment and very tight budget conditions. KSU administrators labeled facilities, equipment, and personnel issues as the most significant barriers to research funding and productivity at KSU.

> **Barriers to Research**
> - Faculty—Turnover and Salaries
> - Infrastructure—Facilities and Equipment
> - Teaching Loads
> - University Culture

Throughout the 1998 interviews, faculty salary was the most frequently mentioned barrier to research. At KSU, a concern was expressed for faculty turnover. As one administrator put it, "Faculty with good research track records are hot and it takes money to retain them." It was recommended that a consistent strategy for retaining faculty be developed. Concern was also expressed for equipment and facilities.

At WSU, three main barriers emerged – teaching loads, general lack of infrastructure, and general lack of campus culture for research. It was argued that federal funding agencies are giving priority to proposals that offer release time as a match – a difficult match to offer given the teaching loads. Facilities, equipment, and technical support for equipment were considered infrastructure barriers at WSU. Administrators also felt that improvement was needed in recognizing the value of research and supporting those engaged in it.

Research barriers at KU discussed during the interviews included salaries, inadequate technical support, the number of graduate students, a grant development support system that is inadequate and scattered, and lack of space for research, particularly laboratories.

Administrators discussed the inadequacy of state support for infrastructure. Kansas's universities are using external grants, through research overhead, to fund very basic research operations. Administrators felt that the ideal situation would be state funding for infrastructure with funding for add-ons generated by faculty through grants.

Investing in and Rewarding Research

Administrators in 1998 had a number of recommendations to increase research funding. They include:

- recruit and retain top level research faculty through more competitive salaries,
- improve grant development support, such as provide grant writing assistance,
- improve research infrastructure—pay more attention to facilities and increase funding for equipment,
- develop more internal funding support (such as seed funding), and
- set priorities and target areas for research.

> **Recommendations**
> - Improve faculty salaries
> - Improve grant development support
> - Improve research infrastructure
> - Develop internal support programs
> - Set priorities and target areas for research

It was also discussed that, as a way to reward successful faculty, universities consider salary augmentation if a person receives more than one grant.

At WSU, the administrators felt that the university just needed to keep moving in the direction it had been moving. "…It involves an attitude of continual discussion of goals and selecting the right people, and rewarding them when they perform." The sentiment was that the upper administration is more willing and able to recognize and reward funded research than in the past. It was argued that it is important that a clear distinction between funded research and non-funded research is made in allocating merit increases.

Various incentives are being offered at Kansas universities to encourage faculty to conduct research. They include rewards through the merit review process, linking proposals to internal research funds, providing seed funding, higher salaries, and return of overhead to the P.I.'s department. Key to motivating faculty to go after grants is the expectation for research – that the university have a philosophy that research is important.

In 1993, administrators talked about making the following changes to invest in and reward research and grant activity:

- greater return of overhead to research units, departments, and principal investigator,
- greater emphasis on recruiting faculty with the capability of securing extramural funding,
- pooling of resources for enhancements in research equipment,
- innovative sharing of overhead funds,
- more resources for productive faculty, and
- greater emphasis on research in the merit process.

Based on the 1998 administrators' interviews, all these changes are being implemented.

Key Findings – Administrators' Interviews

In 1993, there was growing concern that the research mission cannot receive the support it needs to survive in an increasingly competitive extramural funding environment. Funding was just not adequate to support the infrastructure needed to improve the three essential, and at times competing, missions of the university—undergraduate education, graduate education, and research. While all three universities aspired to being research intensive universities, they did not want this done at the expense of undergraduate teaching obligations. University administrators recognized that the quality of education depends upon faculty who are developing new knowledge through research activities. The challenges faced with undergraduate education are just as demanding as those faced in graduate education and research. The 1993 assessment concluded that these challenges required a coordinated effort within each university and across the state's universities.

> **Key Findings**
> - Inadequate funding for infrastructure
> - Difficult to balance the demands of teaching and research
> - Need to develop a culture that recognizes the importance of research to teaching

> In essence, administrators were asking for improved funding from the state for the research mission. However, they were not waiting around for it and were using research overhead funds to fund basic research needs.

The 1998 interviews found that many of these issues still exist—inadequate funding for infrastructure, balancing the demands of teaching and research, and developing a culture that recognizes the importance of research to teaching. The importance of faculty, facilities and equipment to research success was stated over and over again throughout the interviews. In essence, administrators were asking for improved funding from the state for the research mission. However, they were not waiting around for it and were using research overhead funds to fund basic research needs.

Conclusion

In 1993 it was too early to expect large changes as a result of the EPSCoR funding. However, the 1993 assessment concluded that some progress had been made toward addressing and removing barriers to research. Those faculty receiving EPSCoR funding had received equipment, technical support, and graduate student and postdoctoral funding. This funding had an impact upon research productivity and morale of funded faculty. In addition, it was concluded that the EPSCoR process had helped build state-wide collaboration and multi-disciplinary research groups. This 1993 assessment summary is still applicable to the 1997-98 assessment. The EPSCoR program has had many positive benefits—it has provided technician support, elevated research to a competitive level, improved equipment, provided the research basics, provided seed funding, and increased collaboration between Kansas institutions.

KSU, KU, and WSU administrators are focusing upon barriers identified in previous EPSCoR assessments, and progress is being made. However, administrators still feel that equipment, facilities, and personnel issues continue to be barriers to research, and efforts are being made to pool resources and distribute overhead funds in ways that reinvest in research. Administrators continue to search for funds to provide salary adjustments for productive faculty, to create and increase seed funds and bridging funds, and to improve grant development support services.

Despite these efforts, the barriers that face Kansas' three universities remain unchanged. The universities and the state must address ways to:

- recruit and retain top level research faculty through more competitive faculty salaries and provision of start-up funds for research;

- balance the faculty obligations of research, teaching, and administration;

- change the culture to recognize the importance of extramural research funds to the schools' research and teaching programs; and

- improve the level of state support for research through improved funding for infrastructure, such as facilities and equipment.

Appendix A

1997 Faculty Survey

University_____   NSF EPSCoR RESEARCH INFRASTRUCTURE SURVEY   1998

I.   DEMOGRAPHIC INFORMATION:

Q.1   Department_____   Q2. Years employed at this university:_____

Q.2   Title (mark all that apply):
         A_____ Assistant Professor
         B_____ Associate Professor
         C_____ Professor
         D_____ Department Chair
         E_____ University administration
         F_____Non-tenure track academic (museums curators, senior/associate/assistant scientists)
         G_____ Professional (lab director, institute/program director)
         H1___Other (describe)_____

Q.3   Age:_____   4b. Male_____ Female_____   4c. Minority Yes_____ No_____

II.   GRANT ACTIVITY
Please indicate the number of grant proposals submitted to external funding agencies since July 1, 1996.

Q.4   Proposals as PI, co-PI: A Number submitted_____   B Number awarded_____
                                   C Number pending _____

Q.5   Other proposals: A Number submitted_____   B Number awarded_____
                                   C Number pending_____

III.   REWARDS

Q.6   How does your department rate the following during faculty merit reviews?
         (1= most important; 1= least important; rank major categories then rank within category)

         A _____Teaching
                 A1_____Undergraduate teaching
                 A2 _____Graduate teaching
         B _____Research
                 B1 _____Publications
                 B2 _____Grants submitted
                 B3 _____Grants funded
         C _____Service
                 C1 _____Internal
                 C2 _____External

Q.7   How does your department rate the following when filling faculty positions?
(1= most important; 6= least important)

A ____Undergraduate teaching potential or success
B ____Graduate teaching potential or success
C ____Publication potential or success
D ____Cost of start up (space & equipment costs)
E ____Grants funding potential or success
F ____Service

IV.   GRANT DEVELOPMENT SUPPORT

Q.8   Do you receive any form of support or assistance during grant development?
____Yes   ____No (go to Q12)

Q.9   What is your principle source of grant development support?
____Department
____University research/grants administration office
____Other (Specify_____)

Q.10   What type of support do you receive?
A ____Information/networking (funding sources, areas being funded, etc.)
B ____Mentoring (help while planning/writing grant)
C ____Word processing
D ____Photocopying
E ____Budget development
F ____Complete routine parts of grant application
G ____Grant administration
H ____Other (describe) _____

Q.11   What type of support would you like to receive?
A ____Information/networking (funding sources, areas being funded, etc.)
B ____Mentoring (help while planning/writing grant)
C ____Word processing
D ____Photocopying
E ____Budget development
F ____Complete routine parts of grant application
G ____Grant administration
H ____Other (describe) _____

Q.12   Describe the level of grant development/administration support you have received for the
past five years?
___Decreasing   ___No change   ___Increasing   ___Don't know

Q.13   How would you rate the availability of university seed grants to support pilot research?
1   2   3   4   5   ____Don't know
Not   Easily
Available   Obtained

Q.14   How frequently do you contact funding agencies to find out about funding opportunities or
        grant development?
        ____Have not contacted any in the past 5 years
        ____Once every 3-5 years
        ____Every 2 years
        ____Once a year
        ____Once a semester or more

V.   RESEARCH EQUIPMENT

Q.15   Do you require equipment to conduct your research?
        ____Yes   ____No (go to Q.20)

Q.16   How would you describe the majority of the equipment required for your research?
        A ____Not available due to lack of space, funds, support services, etc.
        B ____Old, absolute and/or unreliable (unable to repair, maintain, etc.)
        C ____Adequate
        D ____Competitive
        E ____State of the art

Q.17   How would you describe current funding for equipment repair, replacement, and expansion?

        1   2   3   4   5   ____Don't know
        Not   Always
        available   available

Q.18   To what extent does the current state of your equipment affect your ability to obtain grant
        funding?

        1   2   3   4   5
        Prevents   Provides competitive edge

Q.19   How difficult is it to deal with purchasing regulations?

        1   2   3   4   5   ____Don't know
        Extremely   Extremely
        Difficult   Easy

VI.   RESEARCH FACILITIES

Q.20   How would you describe the research facility you are currently using?

        1   2   3   4   5
        Not   State of
        Adequate   the Art

VII. TECHNICAL SUPPORT AND SERVICES

Q.21   Do you need some form of technical support and services to conduct your research?
_____Yes   _____No (go to Q.26)

Q.22   If YES, how would you describe the availability of that support?

1   2   3   4   5
Not   Always
Available   Available

Q.23   How would you describe the technical support and service you receive?

1   2   3   4   5
Very   Adequate   Supports Cutting
Poor   Edge Research

Q.24   If you do not have access to the technical support and services you need, what type to you need?

VII.   PERSONNEL

Q.25   How many students do you currently direct in research projects at each of the following levels? Please count only those for whom you are the principle advisor. (**If you direct no students, go to Q.28**)
A _____Undergraduate level
B _____Master level
C _____Predoctoral level
D _____Post doctoral level
E _____Other (describe) _____

Q.26   How many graduate and post doctoral students do you fund through research grants?
A _____Graduate   B _____Post doctoral

Q.27   How would you describe your department's ability to recruit graduate students?

1   2   3   4   5
Very   Excellent
Poor

Q.28   How would you describe the quality of the graduate students your department recruits?

1   2   3   4   5
Very   Excellent
Poor

Q.29   What is the biggest barrier to recruiting graduate students to your department?
        A ____Lack of funding
        B ____Noncompetitive salaries
        C ____Lack of fee waivers for Ras
        D ____Departmental reputation
        E ____Lack of industrial base in Kansas
        F ____Other (describe)_____

Q.30   How would you describe the balance between the undergraduate education and graduate
        education mission within your department?

        1   2   3   4   5
        Under-   Graduate
        Graduate   Emphasis

Q.31   How would you describe your department's ability to recruit faculty who are excellent
        teachers and are also nationally recognized research scientists?

        1   2   3   4   5
        Poor   Excellent

Q.32   How would you describe your describe your departments ability to retain faculty who are
        excellent teachers and are also nationally recognized research scientists?

        1   2   3   4   5
        Poor   Excellent

Q.33   What is the biggest barrier to recruiting and retaining faculty in your department with
        potential for or proven excellence in teaching and research?
        A ____Inadequate start-up packages for new faculty
        B ____Heavy teaching loads
        C ____Inadequate facilities
        D ____Inadequate equipment
        E ____Inadequate support services
        F ____Overhead distribution policies
        G ____Departmental reputation
        H ____Salaries
        I ____Other (describe) _____

Q.34   Are you currently involve in collaborative/team research projects?
        ____Yes   ____No (go to Q.37)

Q.35   If YES, do any of your current collaborative/team research projects fit the following
        descriptions?
        A ____Involve faculty within my department only
        B ____Involve faculty outside my department
        C ____Involve faculty on different campuses within the state
        D ____Involve faculty at out-of-state institutions
        E ____Other (describe) _____

XI. OTHER

Q.36   What is the biggest barrier to research productivity and external funding?

Q.37   Have you received funding from any of the EPSCoR programs? If yes, which ones?
        Please indicate what agency program. Check all that apply.
        A ___NSF
        B ___NASA
        C ___POD
        D ___EPA
        E ___DOE
        F ___NIH

Q.38   If you have received funding through EPSCoR, please describe any positive or beneficial
        outcomes of the EPSCoR process that you have seen or experienced. (List specific
        programs)

Q.39   If you have received funding through EPSCoR, please describe any problems, complications,
        or negative impact of the EPSCoR program.

Q.40   Other comments or concerns?