
Enrollment Snapshot of Radiography, Radiation Therapy and Nuclear Medicine Programs, November 2001



American Society of
Radiologic Technologists

January 2002

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Background and Objectives

Background and Objectives

- ◆ Founded in 1920, the American Society of Radiologic Technologists (ASRT) is the largest radiologic science organization in the world, with more than 90,000 members worldwide. The mission of the ASRT is to provide members with educational opportunities, promote radiologic technology as a career and monitor state and federal legislation that affects the profession.
- ◆ Although the 2001 American Registry of Radiologic Technologists (ARRT) report¹ on candidates sitting for primary certification exams indicated that “the past year continued a trend of declining exam volume that began in the mid-1990s,” informal contact with ARRT officials and other anecdotal information suggested that this decline had leveled off and perhaps had reversed itself in the second half of 2001. Given the importance of anticipating trends in the supply of radiologic technologists (RTs) and the lag between RT recruitment and education and new RTs sitting for certification exams, the ASRT attempted to capture a quick “snapshot” of the earliest stage of the recruitment process by surveying directors of educational programs.
- ◆ The 2001 Enrollment Snapshot documents recent trends in the number of students entering educational programs in the primary disciplines of radiologic technology: radiography, radiation therapy and nuclear medicine. Program directors (PDs) were asked to report their entering class sizes during the past three years. However, enrolling in an educational program doesn’t guarantee a student’s entry into the RT workforce, so the survey asked PDs to report their programs’ attrition rates during recent years. Finally, PDs were asked about the future of their programs: plans for increasing or decreasing enrollments and whether there was a possibility that the program might close within the next few years.

Methodology

Methodology

- ◆ On November 1, 2001, the ASRT mailed a one-page questionnaire to program directors (PDs) of every radiography, radiation therapy and nuclear medicine program listed in the American Registry of Radiologic Technologists' *List of Education Programs*.¹
- ◆ The questionnaire asked about recent entering-class enrollments, plans for increases or decreases in program capacity, whether the program might be closed within the next few years and the program's attrition rate during the past few years. (See Appendix A for the full questionnaire.)
- ◆ The intention was to produce a quick "snapshot" of the supply side of the supply/demand balance for radiologic technology disciplines. Other potentially useful questions (e.g., how enrollment figures differed among associate, baccalaureate and master's programs) were omitted from this survey.
- ◆ Dr. Sal Martino presented a summary of the results collected through the middle of November (a return rate of just less than 50% at that time) at a Radiological Society of North America (RSNA) meeting on workforce development issues.² By the middle of December, the final return rate was more than 70%, with 75% radiography programs and 60% of the radiation therapy and nuclear medicine programs represented.

Executive Summary

Executive Summary

- ◆ Founded in 1920, the American Society of Radiologic Technologists is the largest radiologic science organization in the world, with more than 90,000 members worldwide. Its mission is to provide members with educational opportunities, promote radiologic technology as a career and monitor legislation.
- ◆ On November 1, 2001, a total of 777 questionnaires were sent to program directors (PDs) of radiography, radiation therapy and nuclear medicine programs listed by the American Registry of Radiologic Technologists, with 75% of the radiography programs and 60% of the radiation therapy and nuclear medicine programs responding.
- ◆ Projecting the figures for the responding programs to the entire population of programs in the three disciplines leads to an estimated “supply” of 10,582 students entering radiography programs in 1999; 11,160 in 2000 (an increase of 5.5%); and 12,529 (an increase of 12.3% over the 2000 enrollment) making up the 2001 entering class. Corresponding estimates for radiation therapy students are 556 in 1999, 701 (26.1% increase) in 2000 and 860 (22.3% increase) in 2001. For nuclear medicine, the estimated entering class sizes were 922 in 1999, 970 in 2000 (5.2% increase), and 1,252 in 2001 (29.1% increase). Student recruitment into these three disciplines thus appears to be on the rise over the past two years.

Executive Summary

- ◆ Given the two-year lag between entry into and graduation from an associate-degree program and the three-to-four year lag for baccalaureate programs, this increase in entering class size is consistent with anecdotal reports of recent increases in number of students sitting for registry exams.
- ◆ PDs' near-term plans suggest that entering classes will continue to grow. Only 1.3% of the PDs reported plans to decrease enrollments, while 64.3% planned to stay at about the same enrollment level and 34.4% planned to increase their enrollments. Very close to half of the programs (49.7%) report that they are not currently at full enrollment, so there is room for continued expansion.
- ◆ Further, 93.6% of PDs report that their programs “will definitely continue to operate” over the next few years, though a few added qualifying comments, such as “There’s no such thing as ‘definite’ these days.” Twenty-nine programs (5.2%) reported a possibility of closing, while seven (1.3%) indicated that they will be closing or have already closed.
- ◆ Directors of radiography programs reported on average a 21.7% attrition rate “over the past few years.” Radiation therapy programs reported an average 18.1% attrition rate, while the mean attrition rate reported by nuclear medicine programs was 11.8%.

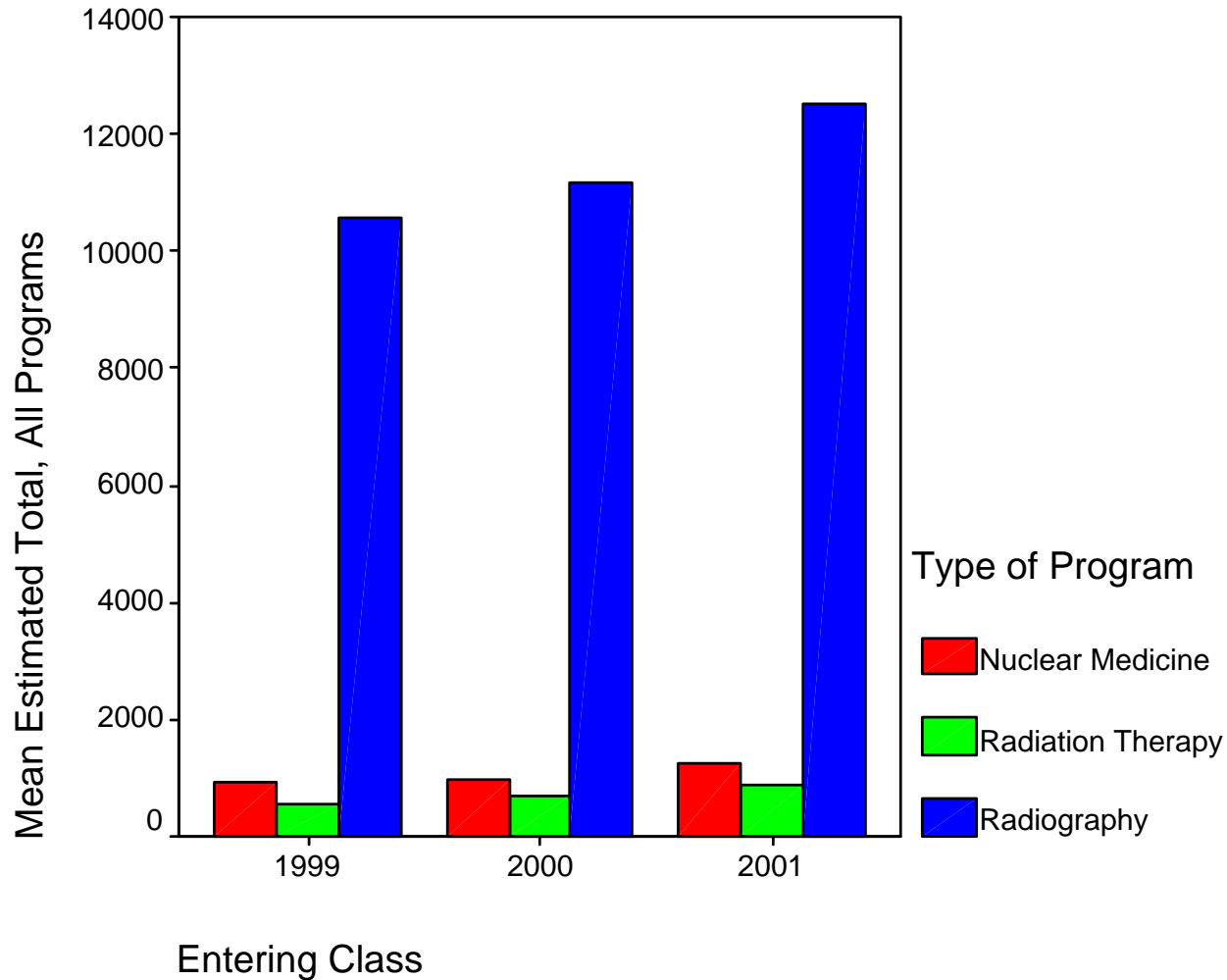
Executive Summary

- ◆ One hundred twenty-three (21%) PDs wrote a total of 129 additional notes or comments on their questionnaires. Eighty-one (63%) of these comments dealt with technical matters, such as what constitutes an entering class in that program or how or over what time span the director computed his or her attrition rate; 33 (26%) dealt with problems in or strategies for recruiting students to the program; 10 expressed concern about the impact of the Joint Review Committee on Education in Radiologic Technology's (JRCERT's) impending master's degree requirement for program directors; and there were five (4%) miscellaneous comments. In addition, six PDs commented separately via e-mail or letter. Of those separate notes, three dealt with the impending master's degree requirement for program directors and the other three dealt with recruitment issues. Appendix B provides a complete listing of these comments.

Enrollment Trends - Detailed Findings

Entering Class Enrollment Trends

All three disciplines showed increased entering class sizes over the past two years.



Entering Class Enrollment Trends

Table summarizing details of enrollment reports:

Type of Program		Numeric 1999 Enrollment	Numeric 2000 Enrollment	Numeric 2001 Enrollment	Attrition rate (percent)
Radiography	Mean	17.94	18.91	21.24	21.66
	N	438	444	445	443
	Std.Deviation	18.978	17.751	26.776	14.258
	Median	15.00	16.00	17.00	20.00
	Minimum	0	0	0	0
	Maximum	325	217	470	97
	Sum	7,856	8,398	9,450	9,594
Radiation Therapy	Mean	6.47	8.16	10.00	18.13
	N	51	51	52	52
	Std.Deviation	3.506	5.167	6.020	20.484
	Median	6.00	7.00	8.00	12.00
	Minimum	0	2	1	0
	Maximum	17	31	30	95
	Sum	330	416	520	943
Nuclear Medicine	Mean	9.13	9.60	12.40	11.77
	N	61	63	63	62
	Std.Deviation	5.533	5.856	9.033	16.136
	Median	8.00	9.00	10.00	6.00
	Minimum	2	0	0	0
	Maximum	35	35	40	98
	Sum	557	605	781	730

Entering Class Enrollment Trends

Crucial results from preceding table:

Type of Program	Year	Total Reported Enrollment	Return Rate	Estimated Total, All Programs	% Increase
Radiography	1999	7,856	438/590 = 74.2%	10,582	---
	2000	8,398	444/590 = 75.3%	11,160	5.5%
	2001	9,450	445/590 = 75.4%	12,529	12.3%
Radiation Therapy	1999	330	51/86 = 59.3%	556	---
	2000	416	51/86 = 59.3%	701	26.1%
	2001	520	52/86 = 60.5%	860	22.3%
Nuclear Medicine	1999	557	61/101 = 60.4%	922	---
	2000	605	63/101 = 62.4%	970	5.2%
	2001	781	63/101 = 62.4%	1,252	29.1%

The radiography program return rate was significantly higher than the return rates for the other two disciplines, $\chi^2_1=13.68$, $P<.001$.

Mean attrition rates reported by PDs were 21.7% among radiography programs, 18.1% among radiation therapy programs and 11.8% among nuclear medicine programs. The nuclear medicine attrition rate was significantly lower than that reported for the other two disciplines, which did not differ significantly.

Entering Class Enrollment Trends

Since programs vary greatly in size, means of the individual program enrollment increases also were examined and are reported in the table to the right.

Type of Program		% increase, 1999 to 2000	% increase, 2000 to 2001	% increase that could be accomodate d
Radiography	Mean	9.0	14.2	28.7
	N	438	444	440
	Std. Deviation	34.0	35.1	59.3
	Median	.0	5.3	.0
	Minimum	-100.0	-100.0	.0
	Maximum	400.0	275.0	650.0
	Sum	3,963.9	6,290.3	12,620.3
Radiation Therapy	Mean	35.3	35.4	36.0
	N	50	50	53
	Std. Deviation	66.7	68.6	106.8
	Median	20.0	14.8	.0
	Minimum	-75.0	-91.7	.0
	Maximum	250.0	300.0	750.0
	Sum	1,763.9	1,769.2	1,905.4
Nuclear Medicine	Mean	18.2	23.2	47.9
	N	61	61	63
	Std. Deviation	50.6	38.4	159.4
	Median	.0	14.3	.0
	Minimum	-100.0	-40.0	.0
	Maximum	200.0	166.7	1,200.0
	Sum	1,107.3	1,462.8	3,019.1

Near-term Changes - Detailed Findings

Near-term Changes

Capacity for increases:

Half of all programs are currently at full enrollment; the other half are not.

			Type of Program			Total
			Radiography	Radiation Therapy	Nuclear Medicine	
Is your program currently at full enrollment?	No	N	2	1	0	3
	response	% within type of program	.5%	1.9%	.0%	.5%
	No	N	223	24	33	280
		% within type of program	50.2%	44.4%	53.2%	50.0%
	Yes	N	219	29	29	277
		% within type of program	49.3%	53.7%	46.8%	49.5%
Total		N	444	54	62	560
		% within type of program	100.0%	100.0%	100.0%	100.0%

Differences among programs nonsignificant, $\chi^2_2=.75$, $P=.512$.

Near-term Changes

Plans for change:

About two-thirds of all programs plan to remain at or about their current enrollment; only about 1% plan to decrease enrollments.

			Discipline			Total
			Radiography	Radiation Therapy	Nuclear Medicine	
Do you plan any changes related to enrollment?	Plan to decrease	N	4 .9%	1 1.9%	2 3.3%	7 1.3%
	Plan to remain the same	N	291 50.2%	30 44.4%	34 53.2%	355 50.0%
	Plan to increase	N	144 32.8%	21 40.4%	25 41.0%	190 34.4%
Total		N	439 100.0%	52 100.0%	61 100.0%	552 100.0%

Ignoring the “decrease” row, differences among programs were nonsignificant, $\chi^2_2=2.34$, $P=.310$.

Near-term Changes

Among all programs, 6.5% (5% of radiography programs, 12% of radiation therapy and nuclear medicine programs) indicate a possibility or a certainty of closing in the next few years.

			Discipline			Total
			Radiography	Radiation Therapy	Nuclear Medicine	
How viable is your program over the next few years ?	Will definitely continue to operate	N	421 95.0%	47 88.7%	55 87.3%	523 93.6%
	There is a possibility of closing	N	19 4.3%	4 7.5%	6 9.5%	29 5.2%
	Will be closing	N	3 .7%	21 3.8%	25 3.2%	190 1.3%
Total		N	443 100.0%	53 100.0%	63 100.0%	559 100.0%

Combining “possibility” and “will be,” the overall differences among the three disciplines are statistically significant, $\chi^2_2=7.68$, $P=.021$, with radiation therapy and nuclear medicine programs being more than twice as likely (12.1%) as radiography programs (5.0%) to indicate that closing in the next few years is a possibility or a certainty: for this difference, $\chi^2_1=7.70$, $P=.006$ and $P<.001$ when adjusted for the fact that the sample includes 70% of the population of programs in these areas.

References

References

1. American Registry of Radiologic Technologists. Numbers continue to decline ... 2000 sees fewer candidates for primary, post-primary exams. Available at: <http://www.arrt.org>. Select "Examinations," then "Exam Statistics." Accessed October, 2001.
2. American Registry of Radiologic Technologists. ARRT-recognized educational programs. Available at: <http://www.arrt.org>. Select "Examinations," then "List of Educational Pgms." Accessed October, 2001.
3. Martino S, Roy L. Workforce crisis: strategies for management. Lecture presented at the Radiological Society of North America; November 28, 2001; Chicago, Ill.

Appendices

Appendix A: Questionnaire

Questionnaire

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Radiography, Radiation Therapy, and Nuclear Medicine Enrollment Survey

Is yours a program in

- Radiography?
 Radiation therapy?
 Nuclear Medicine?
 Other? Please specify) _____

1. Please provide Freshman enrollment figures for the following years – i.e., how many students entered your program each of those years?

1999 2000 2001

2. Is your program currently at full enrollment?

- Yes No

If "No", approximately how many additional students could be accommodated in your program?

3. Do you plan any changes related to enrollment?

- Plan to increase Plan to decrease Plan to remain the same

4. How viable is your program over the next few years?

- Will definitely continue to operate There is a possibility of closing Will be closing

If "Will be closing", how many more years will the program operate before closing?

5. What has the attrition rate been for your program over the past few years (percentage of students that do not complete the program – e.g., 30%)?

Attrition Rate: %

Thanks very much for your help with this survey. Please return the survey in the enclosed business reply envelope to

Richard Harris, Director of Research
ASRT
Department of Education and Research
PO Box 51060
Albuquerque, NM 87171-9980

Appendix B: Comments Written on Questionnaire or E-mailed Separately

Comments on Questionnaire or E-mailed Separately

Program
Type Verbatim Comment

Nuclear
Medicine

Prog:"Ours is a 4 yr BS prog. Accept students in jr yr. Spend jr & sr yr doing NMT"; more detail sep file
Q1:"Class of 2002: 19"; Q3:"expanded clinical sites"
Q1:Crossed out Freshman, repl'd w "Seniors only".
Q3:"Can't recruit any more people into progr!"
Q3: "We have placed the program on inactive status"
Q4: Checked both def'ly cont & poss'ly close, added "Always possible -- no PLANS to close as long as master's degree requirement for PD does not become a problem & institutional support continues"
Q5:"98 20% 2000 33% 99 0% 01 10% thus far"
Q5:"0 for the people formally adopted into the clinical phase of progr"
Q5:"Last 5 years".
Q5:"Over past 3 yrs we have lost 1 of 19 entering students"
On back: "I tend to agree with those who feel opening more schools is not the answer -- we have seen the glut created in the past because of this short term solution. So many schools are not at full capacity - we need to promote our field & change the public's perspective of RTs. Passage of CARE Act would certainly help as well as equal pay with nursing careers."

Radiation
therapy

Q1: "I graduate students every other year: 1995 - 10 grads, 1997 - 7 grads"
Q1:"N/A" 4 99 & 00; "new program" for 01.
Q1:"Note we accepted 3 people w adv'd placement each of above years"/
Q2:"It's at enrollment we want"
Q3:"I hope."
Q4:"? If we don't get a Program Director to replace current."
Q5: "Over last 3 years."
Q5:"One student this year."
Q5:"N/A -- new program"
Q5: "Average from 1995-2000"
Q5: "Just 1 student dropped."
Bottom of form: "Note: Canadian Program!"

Radiography

Top of questionnaire: "Our program has been cancelled as an independent school. However, we remain a partner in the new ____ Institute. Therefore this data needs to be completed by the ____ Institute."

Prog:"Hospital based";Q3:"Since 1998 we have added 3 clinical sites within a 60 mile radius"

Comments on Questionnaire or E-mailed Separately

Q1:"Enrollments increased with announcement of increased salaries in our area. 'Money talks' "

Q1, added "2002: 34"

Q1:"Progm closed 1997-reopened July 2000".

Q1, next to 2001 figure: "10 remaining (lost 2)".

Q1,2001:"Max given our clinical sites".

Q1: "4 year program. Students do not enter until 2nd sem. sophomore year."

Q1:"This is a new program in our 1st year. 12 students began 8/01."

Q1:"1999: 22, 20 grad; 2000: 20, 17 grad; 2001: 20, 16 current"

Q1:"99 6 graduated 2000 currently 8 2001 currently 9

Q1:"In 1999 we increased enrollment from 10 per yr to 12 per yr. Will most likely stay at this number."

Q1:X'd out "Freshman",subst'd "Junior",underlined "entered".

Q2: Circled "could" and added "each class" to "6".

Q2:"It is the # of applicants to the prog that is causing a problem for us"

Q2, N accomodated: 15 "each year".

Q2:"for 2001 --- 2000 under enrolled".

Q2"But lost 5 students 1st semester"

Q2, how many add'l accomodate (7):"for year 2000";

Q2: "In 1st & 2nd year. No -- 3rd year (could handle 10 more)."

Q2: "Increased in 2001"

Q2:"Max prog capacity 40"

Q2: "This was due to attrition."

Q2: "Too late to start"

Q2: 5 "in our 2nd year class"

Q2: Checked "No", then X'd out, checked "Yes".

Q2:"Due to attrition";

Q2:"No junior class"

Q2:"Unless we can take on additional clinical sites"

Q2:"With current staffing"; detailed resp in sep file

Q2:"Yes, for the first year class."

Q2:"approved for 39/yr"

Q2:"due to attrition";

Q2:Initially checked, then crossed out "No", checked "Yes".

Q3:"We have done much recruiting work to achieve better enrollment. Had wait list this yr & it looks good 4 next yr."

Q3: "Administration's decision -- would have to hire a f.t. clinical coordinator."

Q3:"Incr'd from 15 to 17 in Fall 2001"

Q3: "16 to 18 2002"

Q3:"Max based on clinical supervision available";

Q3: "Already increased to 8."

Q3: "But only by 1 or 2 additional students"

Q3: "We increased from 9-12 last year 2000."

Comments on Questionnaire or E-mailed Separately

Q3:"Just did increase enrollment for 2001"
Q3: Plan to increase "2 students".
Q3: "Due to decrease in technologists".
Q3:"# students to # rooms available requires decr in student population from 18 incoming to 15 for 2002."
Q3:"Actively recruiting in area -- max is 16 students; did not have the applicants to fill the positions"
Q3:"Because we incr'd enrollment from 20 to 36 in year 2001 (total #)."
Q3:"Have already increased capacity"
Q3:"Hope". Q4:"Well, at least that's what we're told."
Q3:"Increased this year"
Q3:"Just incr'd enrollment this year";Q4:Will finish currently enrolled classes for sure. May be merging"
Q3:"Looking at this now -- possible increase."
Q3:"Meet full enrollment goal --> 48". Q5: "F97-F98 25%; f98-F99 20%;F99-F00 34%;F00-F01 24%"
Q3:"Not sure as of right now"
Q3:"Once outpatient facility is completed (3 years)." Q4: "Is anything ever 'definite'?"
Q3:"Please don't overdo it -- like the last time!"
Q3:"Unless changes made by JRC"
Q3:"We have active recruitment activities to incre enrollm & 2001 incr'd over 99 & 00";Q5:"average"
Q3:"Would like to increase, but no budget for additional faculty"
Q3:"by 4-6"
Q3:"perhaps incr by 2/yr for next 2 yrs."; Q4:"as far as I know now"
Q3:"utilize an additional clinical site";Q4:"Probable since new Masters degree requirement in 2009"
Q3:Enrollment not at 'max' bec there is a lack of qualified applicants."
Q3:Fill classes 14-14"
Q3:Remain same "but recruit more intensely". See add'l comments in Word file.
Q3:There's need to incr enrollm but bec of restricted state funded can't consider. Moratorium on enrollm"
Q4: "New JRCERT standards will have an effect here."
Q4:"Possible merger"
Q4:Will finish currently enrolled classes for sure. May be merging with another program or close due to Master's Degree requirement.
(Budget not able to withstand hiring masters.)"
Q4: "9 mos. Still discussing transfer of sponsorship"
Q4: "My program is located in Most hospital based programs in area have closed. (Only 1 left.) The shortage here is CRITICAL.
We are looking at options to partnership with the hospitals to incr our faculty numbers and increase our student capacity to 60
[underlined] per year."
Q4:"Univ is undertaking review of all programs."
Q4:*Due to JRCERT action & new standards effective 1/1/2002"
Q4:"Probable since new Masters degree requirement in 2009"
Q4:"You may see more closings of hosp radiography progs by 2007 because of the Masters degree requirement for PDs"
Q4:" Unsure how to answer this question -- may depend on new JRCERT requirement in Standard 6, and other factors."
Q4:"Until the community feels it is no longer needed!"
Q4:"What I am told" (def'ly continue); "Reality, if enrollm trend continues" (Poss of closing)

Comments on Questionnaire or E-mailed Separately

Q4: Will definitely continue, but "My boss (VP of HR) was just fired on Halloween tho! Cut backs in Hospital FTE's are increasing here."

Q4:"We have all intentions of remaining open in the years to come. However, there are no 'definites' in healthcare these days!"

Q5: Underlined 'few years', put ? under it. Added "Over past 5 years."

Q5: Varies from year to year. Usually less than 10%."

Q5:"I calc'd attrition rate by taking # of students orig'ly enrolled & # that grad'd w their orig class only"

Q5:"(5 year average)"

Q5:"over 6 years"

Q5:"20-25%"

Q5:"3 yrs av" &more detailed

Q5: "Over 5 years"

Q5: "(Ave 3 yrs)"

Q5:"past 3 grad classes; 29% past 5 yrs"

Q5: "1997-2001"

Q5:"for 5 years" and "Students ill prepared for intense nature of program, have worked to address this, continues to present a challenge."

Q5:"Since 2000".

Q5: "Last year. 4% so far this year."

Q5: 0% "past 3 years"

Q5: 11% over 5 years (1997-2001). See add'l comment in Word file.

Q5: 19% "over last 5 years"

Q5:"+ all passed ARRT exam";

Q5:"0.025%";"I need this survey data. Could you please send me the results ASAP? Thanks."(no ret addr)

Q5:"20 to 50%, improving as job market improves"

Q5:"2000-50%; 2001-7%"

Q5:"3 year average; 26.5% 5 yr average"

Q5:"Average of 98,99,2000"

Q5:"Last 2 yrs -- which is higher than normal"

Q5:"Need to identify 'few years!' "

Q5:"No control over type of student we receive. Admin makes the decisions.";scanner skipped

Q5: "Our students come as second careers or career opportunity. Our average age is about 28 years. Most of our students have to work. Some have families to support. We lose many students because they do not have the time to study to successfully pass their classes. We are an inner city college and our students have financial problems."

Q5:"Over the last 5 years"

Q5:"This is the rate for years listed in # 1"

Q5:"We are a new program. Starting our 4th year."

Q5:"for the past 5 years"

Q5:"in 2001; 50% 2000."

Q5:"last 3 years"

Q5: "With salaries as low as they are, you do not get a high quality applicant, thus high attrition. The students that do complete the

Comments on Questionnaire or E-mailed Separately

program look at other imaging modalities for \$. 65-70% of our graduates have gone into another modality. As long as salaries stay low, & no licensure requirement [respondent's state] I do not see the radiography deficit improving. Where can we expect to find this info. summarized as a result of this survey?"

Q5:"over 5 years"

Q1:Said "don't accept frosh" but gave numbers entering.

See Word file for long comment.

Q3: "Already incr'd 25% for 2001."

Q5:"Range 26%,22%,12%,10%,20%."

Q5:"This rate is for the years listed in Q1."

Q5:"estimate: I am a new director"

At end: "Please help to grandfather Program Directors without a Masters degree. I am a site visitor and this JRCERT policy will eliminate many experienced and qualified educators. Leave the policy in place, but allow for current Grandfathering to occur or our profession will suffer in the end, as will the patients we treat."

On back:

"We have always been able to fill the program seats. The problem seems to be filling the seats with 'QUALIFIED' individuals. Lately we have seen a decrease in work ethic and understanding of basic communication and math skills. Therefore, when the students enter the program, they very quickly drop because of their inability to comprehend what is going on around them. The results: higher attrition.

Case in point, I have always begun the first semester with Radiographic Physics. The text is Carlton/Adler's Principles of Radiographic Imaging. Never before have I needed to begin with the first chapter, "Basic Mathematics". This year I had to because the students were lost. Several students did not even understand the concepts of parallel and perpendicular or that mA x seconds = mAs.

I am pulling my hair out trying to recruit better-qualified students. If any one has ideas, please share!"

PostIt note: "Please document that the recent JRCERT requirement for program directors -- a Masters degree by year 2007 WILL lead to a CLOSURE & INCREASED SHORTAGE of technologists in this country."