

# RELATING DEAF STUDENTS' READING AND LANGUAGE SCORES AT COLLEGE ENTRY TO THEIR DEGREE COMPLETION RATES

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GRADUATION PATTERNS were examined for 905 deaf students (1990–1998) at the National Technical Institute for the Deaf. Students with higher reading and language skills had the best overall graduation percentage. Comparison of recipients of different degrees—bachelor of science (BS) versus fine arts (BFA); associate of applied science (AAS) versus occupational studies (AOS)—showed 92% of BS and 82% of AAS graduates reading at the 9th-grade level or above, versus 65% of BFA and 47% of AOS graduates. Interestingly, 80% of non-degree-earning students read at the 9th–12th grade levels; in absolute terms, they outnumbered graduates with similar reading skills in the AAS and BFA programs combined, and in the BS program. This indicates a need for improved counseling, placement, and retention strategies. Students performed similarly across degree categories, regardless of curriculum requirements and difficulty. Only non-degree-earning students had significantly lower grade averages.

Deaf students enter college with high expectations.<sup>1</sup> During orientation for incoming deaf students in academic years 2001–2002 and 2002–2003 at the National Technical Institute for the Deaf (NTID), more than 50% of these new students indicated that their goal was a baccalaureate degree; another 20% in 2001 and 27% in 2002 listed their goal as earning both bachelor's and graduate degrees (Rosica, Adams, & Kelly, 2001, 2003). However, only about 17% of the incoming deaf students at NTID in 2001 and 2002 had the requisite reading and language skills to enter a baccalaureate program in their first year. Furthermore, the students (and per-

haps their parents) did not have a realistic understanding of the time required to complete a degree. "With the exception of deaf students directly admitted to an RIT [Rochester Institute of Technology] college other than NTID, students who are deaf take a longer time to get a degree than hearing students." (National Technical Institute for the Deaf, 2001, p. 44). On average, at NTID it takes deaf students 4.5 years to complete an associate of occupational studies (AOS) degree and 4.7 years to earn an associate of applied science (AAS) degree. At RIT, on average it takes deaf students 5.7 years to complete a bachelor of science (BS) degree if they have

transferred from NTID with an associate's degree, and 6.8 years if they have transferred without such a degree.

Gallaudet University and NTID combined serve approximately 2,400 undergraduate students annually. While estimates vary, it has been projected that another 5 to 8 times that number are enrolled in other 2-year and 4-year postsecondary educational institutions (National Center for Education Statistics, 1999; Rodriguez, 2000). This suggests that anywhere from 9,600 to 16,800 deaf students enroll in other postsecondary programs that are designed primarily to serve typical hearing students. Furthermore, it has been estimated that of all the deaf students enrolled in college, only 8% read at the eighth-grade level or higher (Allen, 1994). If academic advisers and counselors in community colleges and universities are to provide guidance to entering deaf students that will help these students achieve their degree goals, these advisers and counselors need to have a better understanding of the state of deaf students' reading and language skills upon college entry. One way to develop such understanding is to examine recent graduation rates among a significant number of deaf students in light of their reading and language skills at entry into college.

The reasons some deaf students do not complete their baccalaureate degree program are numerous and have been discussed at length (e.g., Stinson & Walter, 1992, 1997). Lang (2002) has noted:

Academic preparation and the challenges of learning through support services are only two pieces of the complex mosaic. Other factors include leaves of absence, program lengths, difficulty in carrying full loads, dissatisfaction with social life, and changes

in career interests (Lang & Stinson, 1982; Stinson & Walter, 1992). (p. 268)

For those students who persist in degree programs to graduation, reading and language skills intuitively appear to be important to successful academic study. Therefore, these skill areas are the focus of the present study.

### Research Questions

Answers to the following questions would be helpful to educators involved in advising and counseling the 9,600 to 16,800 deaf students currently enrolled in 2-year and 4-year colleges and universities in regard to these students' postsecondary education and undergraduate degree goals:

1. Do deaf students' reading and language abilities at entry to college influence the types of degrees they complete?
2. Does the academic performance of deaf students vary by type of degree earned as reflected by the cumulative grade point average (GPA)?

Because independent study and reading of advanced text materials continue to be critical components of academic success in colleges and universities, we predicted for the present study that deaf students with higher reading and language skills would show the most success at earning baccalaureate degrees. We also expected that deaf students who entered the college environment underprepared—i.e., those lacking the reading and language levels required for acceptance into baccalaureate programs—would show greater success at earning associate degrees. Furthermore, we expected that underprepared deaf students who were placed in sub-baccalaureate programs of study would generally have

poorer academic performance as reflected in their GPAs.

### Method

A total of 905 deaf college students who had attended RIT were included in the present study. This group represented a subset of students who were enrolled between 1990 and 1998 in courses for one or more quarters in an RIT college other than NTID. This subset was selected on the assumption that deaf students taking courses in other RIT colleges have the long-term goal of earning a baccalaureate degree. Of the subset of 905 students, 513 (57%) completed one of the undergraduate certificate, diploma, or degree options offered by NTID and RIT. Another 19 (2%) completed a graduate program at the master's level. The graduation options offered by NTID and RIT are:

- Certificate (CT): Requires course work in a specifically defined area of technical study.
- Diploma (DP): Requires completion of 36 to 45 quarter credit hours of technical instruction.
- Associate of occupational studies (AOS.): An applied, work-oriented associate's degree that requires 57 to 69 quarter credit hours of technical instruction. In addition, students must complete a specific number of credit hours in English, communication, general education, and mathematics. Students are not required to meet the RIT writing requirement for graduation.
- Associate of applied science (AAS): Permits students to enter a career directly upon graduation, or to transfer to upper-division programs in other colleges of RIT. Requires 57 to 69 quarter credit hours of technical instruction.

tion. In addition, students must complete 20 credit hours through RIT's college of liberal arts and other required credit hours as determined by the program of study. Students must also meet the RIT writing requirement for graduation.

- Baccalaureate degrees (bachelor of science, BS; bachelor of fine arts, BFA): Students must complete all courses required for graduation from a 4-year program in one of the other RIT colleges. (A bachelor's degree requires completion of 180 to 200 quarter credit hours.) Students must meet the RIT writing requirement for graduation.
- Master's degrees (master of science, MS; master of arts, MA): Students have to complete a minimum of 45 quarter credit hours beyond the baccalaureate level in any RIT master's degree program.

The student data analyzed with respect to categories of earned degrees included the entrance scores from the California Achievement Test for Comprehension (Tiegs & Clark, 1963) and the Michigan Test of English Language Proficiency (English Language Institute, 2003), degree of hearing loss, parents' hearing status, cumulative GPAs, and type of degree earned. The California Achievement Test for Comprehension is administered to first-year deaf students entering NTID. The same version of the California Achievement Test has been administered to entering NTID students since 1974 because it has no test items that contain auditory biases and provides a stable comparative database over time. The Michigan Test of English Language Proficiency includes items on grammar, vocabulary, and reading. According to the English

Language Institute at the University of Michigan, this test is used in estimating whether a student whose native language is not English is able to pursue academic study in an English-language college or university (English Language Institute, 2003).

Depending on the variable under consideration, in the present article the actual student population may vary slightly from 905. This is because some data were missing or incomplete for some of the students in the NTID master file.

### Results

For each type of degree earned by the students in the present study, there was no statistically significant difference in hearing loss among the students in any of the degree categories for either the right ear,  $F(6, 792) = .12, p = .99$ , or the left ear,  $F(6, 791) = .17, p = .98$ . The average hearing loss per degree category ranged from 93 to 105 dB. These findings suggest that amount of hearing loss does not ap-

pear to be a factor with respect to the type of degree earned.

Regarding parents' hearing status, parental information was available for 881 students. Of the 881 students, 92.6% had two hearing parents, 1.7% had one deaf parent, and 5.7% had two deaf parents.

### Reading Skills at College Entry and Rates of Degree Completion

Table 1 shows the distribution of deaf students for degrees earned per each reading grade-level range. A chi-square statistical test,  $\chi^2 = 82.9, df = 25, p = .0001$ , showed a significant relationship between reading level and type of degree earned. This indicates a differential pattern of degrees earned across the reading grade-level ranges.

The student distributions for degree completion per grade level from Table 1 are presented as percentages in Table 2. In this form, the data show that the group with measured reading abilities at the 10th grade level or

**Table 1**  
Distribution of Deaf Degree Recipients by Reading Level at College Entry, by Degree

Reading range (by grade level)	<i>n</i>	No degree	CT	DP	AOS	AAS	BFA	BS
5.8–6.9	10	(5)			2	1	1	1
7.0–7.9	32	(17)	1	2	4	1	4	3
8.0–8.9	62	(24)		1	4	12	14	9
9.0–9.9	139	(61)	1	1	5	28	15	28
10.0–10.9	155	(48)	3	4	3	20	9	68
11.0–11.9	104	(47)	1		1	11	6	38
12.0	52	(27)				4	2	19
Subtotals	54	(229)	6	8	19	77	49	166
Information missing or not available	351	(244)	5	1	4	25	39	114
Totals	905*	373	11	9	23	102	88	280

*Note.* CT, certificate; DP, diploma; AOS, associate of occupational studies; AAS, associate of applied sciences; BFA, bachelor of fine arts; BS, bachelor of science. \*No information on reading level at college entry was available for the 19 master's degree recipients in the present study.

higher clearly had the highest percentage of students earning baccalaureate degrees. At the lower reading ranges, the percentage rates of successful degree completion at the baccalaureate level dropped significantly. While this evidence suggests that reading ability is associated with type of degree, it does not mean that lower reading scores will absolutely prevent one from earning a baccalaureate degree—approximately 20% of the students in the sixth-grade and seventh-grade reading ranges earned a BFA or BS degree. However, not only were there relatively fewer students in the lower reading ranges, the likelihood of successful degree completion at the bac-

caureate level for these students was clearly reduced. Of the 215 students with available reading scores who earned a bachelor's degree, 86.0% had reading scores at the ninth-grade level or higher. However, there are some clear distinctions between those deaf students who earned a BS degree and those who earned a BFA degree. Of the 166 students who earned a BS, 92.2% had reading scores at the ninth-grade level or above. Of the 49 students who earned a BFA, 65.3% had reading

scores at the ninth-grade level or above. Of the 34.7% who had reading scores at the eighth-grade level or below, most were reading in the eighth-grade range. A similar graduation pattern occurred for recipients of associate degrees. Overall, 75.0% of all the associate degree graduates had reading skills at the ninth-grade level or above. When only the 77 AAS degree holders (who had to meet the RIT English writing requirements for graduation) were considered, we found that 81.8% had reading scores at the ninth-grade level or above; of the 18.2% at the eighth-grade level or below, most were reading in the eighth-grade range. In

grade levels. The AAS degree graduates had a clearly higher average reading level ( $M = 9.6$ ) than the BFA graduates ( $M = 9.0$ ), and looked very similar to the BS degree recipients ( $M = 9.9$ ) in regard to this attribute. A one-way ANOVA showed a significant difference in reading scores among AAS, BFA, and BS recipients,  $F(2, 306) = 3.078, p = .0475$ . Subsequent post hoc comparisons showed that BFA graduates had a significantly lower mean reading level than BS graduates, Fisher's protected least significant difference (PLSD) critical difference = .726,  $p = .014$ , while there was no statistically significant difference between AAS and BS graduates in mean reading ability, Fisher's PLSD critical difference = .630,  $p = .3901$ .

However, having a higher reading ability does not guarantee that a deaf student will successfully complete a degree program. Of the 229 students with reading scores who did not earn a degree, 122, or 53%, were reading at the 10th-grade level or higher. When one adds the 61 students reading at the ninth-grade level, then 183, or 80%, of the students who did not earn a degree had reading abilities in the 9th–12th-grade range. In fact, these 183 students, who clearly had the reading skills to succeed in degree programs, outnumbered the combined graduates with similar reading levels who received the AAS degree ( $n = 63$ ) and the BFA degree ( $n = 32$ ), and also exceeded in number the 153 BS recipients reading in the 9th–12th-grade range. Whether these students who did not earn a degree transferred to other postsecondary institutions to do so is not known. What is known is that they did not earn any type of degree from either NTID or one of the other colleges of RIT. As noted previously, the factors that cause deaf students to leave the university without complet-

**Table 2**

Percentage Distribution of Deaf Degree Recipients by Reading Level at College Entry, by Degree Category

Reading range (by grade level)	<i>n</i>	No Degree	Certificate or diploma	Associate's degree	Bachelor's Degree
5.8–6.9	10	50.0%	0.0%	30.0%	20.0%
7.0–7.9	32	53.1%	9.4%	15.6%	21.9%
8.0–8.9	62	38.7%	1.6%	25.8%	33.9%
9.0–9.9	139	43.9%	1.4%	23.7%	30.9%
10.0–10.9	155	31.0%	4.5%	14.8%	49.7%
11.0–11.9	104	45.2%	1.0%	11.5%	42.3%
12.0	52	51.9%	0.0%	7.7%	40.4%

Note.  $n = 905$ . Information was missing or not available for 351 students. Because of rounding, all rows of percentages may not total 100.0.

comparison, of the 19 AOS degree recipients (who did not need to meet the RIT English writing requirements), only 47.4% were reading at the ninth-grade level or above.

One final observation of interest can be made about the AAS, BFA, and BS recipients as described in Table 1. Not only did a higher percentage of AAS recipients than BFA recipients read at the 9th-grade level or above, but there were significantly more of the AAS recipients in terms of actual numbers reading at the 9th–12th-

ing a degree of any type have been documented elsewhere (Lang, 2002; Lang & Stinson, 1982; Stinson & Walter, 1992, 1997).

### Language Skills at College Entry and Rates of Degree Completion

Similar graduation patterns occurred in relation to the language skills measured by the Michigan Test of English Language Proficiency. Tables 3 and 4 detail the distribution of deaf students by degree earned per Michigan test score category. A chi-square statistical test,  $\chi^2 = 77.21$ ,  $df = 15$ ,  $p = .0001$ , showed a significant difference across reading levels relative to the pattern of

ing higher language abilities does not guarantee that deaf students will successfully complete a degree program, as evidenced by those leaving the university with no degree.

An overall ANOVA test showed a significant difference among degree levels for the group means on the Michigan test,  $F(6, 529) = 9.16$ ,  $p = .0001$ . The post hoc analyses revealed the following differences in Michigan language scores: AAS recipients students ( $M = 77$ ) had a significantly lower language-skill level than BS recipients ( $M = 84$ ), Fisher's PLSD critical value = 2.8,  $p = .0001$ ; BFA recipients ( $M = 76$ ) had a similar average score to that of AAS recipients ( $M =$

### “Missing or Not Available” Reading and Language Scores and Degree Completion

From Tables 1 and 3, it is evident that a significant number of deaf students who do not have either reading or language scores in the NTID master file database successfully graduate with baccalaureate degrees. This finding is due to the fact that deaf students who are direct admits to one of the other eight RIT colleges are not subject to the entry testing programs in NTID. Furthermore, the deaf students directly admitted to the other RIT colleges are accepted because they meet the entry requirements that all entering students must meet. Therefore, most likely, students directly admitted to other RIT colleges have reading and language skills on par with those of all students accepted to those colleges. Thus, it is not surprising that direct-admit students have a high rate of graduation success.

Also, judging from the distribution of degrees at the certificate, diploma, and associate levels earned by deaf students in the “missing or not available” category of reading and language scores, it appears that these figures probably represent missing data for NTID students and not students directly admitted to other RIT colleges. Many of these students may have entered NTID sometime in mid-year and thus did not go through the testing program during the fall quarter orientation.

**Table 3**  
Distribution of Deaf Degree Recipients by Michigan Language Test Scores at College Entry, by Degree Category

Michigan Test of English Language Proficiency score range	<i>n</i>	No degree	CT	DP	AOS	AAS	BFA	BS
50-59	23	(10)	0	1	3	4	3	2
60-69	58	(19)	2	2	4	9	11	11
70-79	151	(56)	1	3	8	39	16	28
80-89	185	(70)	3	1	3	14	14	80
90-100	120	(61)	0	0	0	9	6	44
Subtotals	537	(216)	6	7	18	75	50	165
Information missing or not available	368	(159)	5	1	5	26	38	115

*Note.* CT, certificate; DP, diploma; AOS, associate of occupational studies; AAS, associate of applied sciences; BFA, bachelor of fine arts; BS, bachelor of science. \*No information on reading level at college entry was available for the 19 master's degree recipients in the present study.

degrees earned.

As shown in Tables 3 and 4, deaf students with higher language skills were more numerous and graduated at a higher rate at the baccalaureate level—87% of the baccalaureate graduates and 78% of the associate degree graduates had a Michigan language score of 70 or higher. But again, hav-

ing higher language skills does not guarantee that deaf students will successfully complete a degree program, as evidenced by those leaving the university with no degree. An overall ANOVA test showed a significant difference among degree levels for the group means on the Michigan test,  $F(6, 529) = 9.16$ ,  $p = .0001$ . The post hoc analyses revealed the following differences in Michigan language scores: AAS recipients students ( $M = 77$ ) had a significantly lower language-skill level than BS recipients ( $M = 84$ ), Fisher's PLSD critical value = 3.3,  $p = .0001$ . These findings further support the notion that higher-level language skills may not be as important for success in a BFA program of study as in a BS program.

### Cumulative GPA and Degree Completion

Cumulative GPAs per degree program are presented in Table 5. An overall ANOVA test showed a significant difference among degree levels for cumulative GPAs,  $F(6, 820) = 30.03$ ,  $p = .0001$ .

Subsequent post hoc analyses using Fishers PLSD to examine pair-wise comparisons between the means showed that students in all the completed-degree groups had significantly higher mean cumulative GPAs than the students who did not earn a degree. Fisher's PLSD critical value for each category of degree recipient was:

- CT: .383, p = .0097
- DP: .447, p = .0008
- AOS: .270, p = .0009
- AAS: .143, p = .0001
- BFA: .151, p = .0001
- BS: .102, p = .0001

in the graduation patterns of the set of 905 deaf college students included in the analyses. As predicted, the students with the higher reading and language skills had the highest graduation percentage for baccalaureate degrees, as well as for associate degrees. While deaf students with lower reading abilities did show increased graduation success for associate degrees, still, 75% to 78% of the students earning associate degrees had reading and language skills similar to those of the baccalaureate graduates. These findings might be attributable to those students who were primarily baccalaureate bound anyway but first earned an AAS

amount of curricular content. Second, a portion of the GPA results may be attributable to grade inflation. Although these are possible factors, deaf students who persist to graduation regardless of degree type do consistently obtain better grades. Only those students who leave the university without earning a degree show consistently poorer academic performance.

The findings of the present study can be summarized as follows: First, there were no statistically significant differences in the level of students' hearing loss across degree types earned; thus, hearing level did not appear to be a relevant factor in their

**Table 4**  
Percentage Distribution of Deaf Degree Recipients by Michigan Language Test Scores at College Entry, by Degree Category

Michigan Test of English Language Proficiency score range	n	Degree Category			
		No degree	Associate's degree	Bachelor's degree	
50-59	23	43.5%	4.3%	30.4%	21.7%
60-69	58	32.8%		22.4%	37.9%
70-79	151	37.1%	2.6%	31.1%	29.1%
80-89	185	37.8%		9.2%	50.8%
90-100	120	50.8%	0.0%	7.5%	41.7%

Note. n=905. Information was missing or not available for 351 students. Because of rounding, all rows of percentages may not total 100.0.

In other words, all deaf students who completed some type of degree program had significantly higher cumulative GPAs than those deaf students who left the university without a degree. In turn, there were no significant differences in GPA among those students earning the six types of degrees.

**Summary and Discussion**

One of the more interesting and important findings of the present study is that there are generally no surprises

degree before transferring to baccalaureate programs of study in other RIT colleges.

What was not predicted was the similarity of academic performance across all degree categories—certificate, diploma, associate, and baccalaureate—as reflected in the cumulative GPAs of the students. Several factors may account for this pattern of similarity in GPAs. First, requirements in the different degree programs obviously vary in terms of difficulty and

**Table 5**  
Mean Cumulative Grade Point Average (GPA) per Degree Earned

Degree earned	n	Cumulative GPA	
		M	SD
No degree	323	2.3	0.8
Certificate	11	2.8	0.4
Diploma	8	3.1	0.4
Associate of occupational studies	23	2.8	0.7
Associate of applied science	102	2.9	0.6
Bachelor of fine arts	87	2.9	0.4
Bachelor of science	275	3.0	0.4
Subtotal	829		
Missing GPA data	76		
Total	905		

graduation patterns. With regard to reading skills, deaf students earning either an AAS or BS degree had similar reading averages in the ninth-grade range that were not significantly different. Interestingly, the deaf students graduating with a BFA degree had a significantly lower reading average than the BS recipients. This suggests that students with slightly lower reading abilities—i.e., in the eighth-grade reading range—have the potential to be successful in arts programs at the baccalaureate level.

The highest percentages of students earning baccalaureate degrees were those with reading abilities at the 10th-grade level or higher. Not only were the percentages higher, the actual numbers of students at the 10th–12th-grade reading levels in baccalaureate programs were significantly greater. This indicates that deaf students with higher reading skills are accepted into baccalaureate programs and persist to degree completion, as evidenced by the graduation rates. Of the 215 deaf students with available reading and language data who graduated with baccalaureate degrees, 142 (66%) had reading abilities at the 10th-grade level or higher. Another 43 (20%) had reading abilities in the ninth-grade range. Thus, a total of 185 deaf students out of 215 who graduated with baccalaureate degrees were reading at the ninth-grade level or higher. This represents 86% of all the deaf students with available reading and language data who graduated at the baccalaureate level at RIT from 1990 to 1998.

If one factors in the other deaf students who graduated from RIT with baccalaureate degrees who were “direct admits” to the other RIT colleges but who did not have reading and language data in the NTID master file, then the percentages of graduation for

the higher-level readers is even more dramatic. One should bear in mind that deaf students who are directly admitted to the other RIT colleges meet all the entry requirements, and thus are assumed to be reading at a grade level appropriate for typical high school graduates qualified to enter a college or university. With these students factored in, 338 of the 368 deaf students (91.8%) who graduated with baccalaureate degrees from 1990 to 1998 at RIT were reading at the ninth-grade level or higher. Of the 30 deaf students (8.2%) with lower reading levels who graduated with baccalaureate degrees during this 9-year period, 2 (or 0.5% of the 368 students) had reading abilities in the fifth-to-sixth-grade range, 7 (or 1.9% of the 368) had reading abilities in the seventh-grade range, and 21 (or 5.7% of the 368) had reading abilities in the eighth-grade range.

While we do not suggest that it is impossible for deaf students with lower reading abilities to be successful in baccalaureate degree programs, the present study does clearly document the challenge. For the relatively few deaf students in the fifth-to-seventh-grade reading range who earned a baccalaureate degree, other personal factors must also have come into play. For example, these students must have been highly focused, motivated, and persistent. For what they lacked in reading and language skills, their desire to graduate with a baccalaureate degree undoubtedly made up the difference. Also, it should be noted that of the 30 students with lower reading abilities who graduated with a baccalaureate degree, 17 (56.7%) graduated with a BFA degree. As shown in the results section of the present study, deaf students who graduated with a BFA from a fine arts program of study had a significantly lower reading

average than those deaf students who graduated with a BS degree. In fact, the mean reading level of the BFA degree graduates ( $M = 9.0$ ) was considerably lower than that of the AAS degree graduates ( $M = 9.6$ ), whose reading abilities resembled more closely those of the BS recipients ( $M = 9.9$ ).

The importance of reading and language skills applies also to associate degrees. The graduation pattern for the period 1990–1998 showed that 75% of deaf students graduating with an associate degree had reading skills at the ninth-grade level or higher. In the area of language proficiency, 78% of the deaf students earning an associate degree had a Michigan score of 70 or higher. Thus, not surprisingly, deaf students’ reading and language skills evidently are critically important factors in the successful completion of both associate and baccalaureate programs, especially for AAS and BS degrees.

With regard to academic performance, the mean cumulative GPA for each degree group ranged from 2.8 to 3.1 (on a 0.0–4.0 scale), and there were no statistically significant differences among them. In contrast, the students in the “no degree” category had a mean cumulative GPA of 2.3, which was significantly lower when compared to the GPA of each group of degree recipients. While one might also expect that students who were underprepared and were placed in sub-baccalaureate programs of study would have poorer academic performance, the evidence is to the contrary. Regardless of degree type, if deaf students persist to graduation, apparently they have sufficient motivation and study skills to achieve better grades. However, this does not suggest that they are performing equally in comparable programs of study. The chal-

allenges and difficulty levels are substantially increased in advanced programs of study. Only the students who leave the university without a degree show a significant drop-off in academic performance.

Finally, the present study disclosed a high number of deaf students (183 of 229, or 80%) who had the reading ability (9th–12th-grade range) and language skills to succeed in AAS and BS degree programs but left the university without earning a degree. Such results suggest the need for improved placement, advising, and counseling to improve such students' retention and success. Further research needs to be conducted on these high-ability deaf students who have the potential for academic success but fail to achieve their degree aspirations.

The findings of the present study also have implications for other academic skills necessary for deaf students to be successful in postsecondary programs of study. For example, it has been shown that deaf college students with higher reading skills do better at mathematical word-problem solving that involves comprehending comparative relational language (Kelly, Lang, Mousley, & Davis, 2003). Deaf college students with higher reading abilities have also demonstrated the ability to better explain their mathematical problem-solving strategies in both written and signed explanations (Mousley & Kelly, 1998). Additionally, research has shown that higher-level deaf college readers do better at mental mathematical calculation than deaf college students with lower-level reading skills (Davis & Kelly, 2003; Kelly & Davis, 2003). Such studies show the impact of reading and language on other academic skill areas.

The present study offers valuable information to advisers and counselors of deaf students entering postsecondary

programs, as well as educators of deaf students at the elementary, middle, and high school levels. Unequivocally, the results show the relationship between higher reading and language skills and degree completion for both the associate and the baccalaureate degrees. In regard to deaf students entering a college or university, these findings can assist academic advisers or counselors in establishing realistic degree goals and appropriate programs of study to achieve those goals. Perhaps such reality-based advising can help to temper deaf students' frustrations resulting from changes and delays in reaching their graduation goals because they may have chosen to pursue unrealistic fields of study.

For educators of deaf students in the K–12 grades, a continuing and increased commitment to reading and language instruction needs to be reemphasized. The reading and language skills that deaf students acquire in their K–12 experiences provide the foundation for success or failure in both college and careers. The evidence is clear that without stronger reading and language skills, deaf students generally will not be successful in programs of study at the baccalaureate level. This will also be true at the associate degree level if the academic curriculum is primarily pre-baccalaureate study intended for students who want to transfer credits to a 4-year degree program. Reading, language, and mathematical skills are critical to success in all types of postsecondary academically oriented programs at the associate and baccalaureate levels, and the graduation patterns of deaf students documented in the present study demonstrate that reality.

## Note

1. In the present article, the term deaf refers to both deaf and hard of hearing students.

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