Academic Engagement in Students with a Hearing Loss in Distance Education

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This investigation compared 267 students with a hearing loss and 178 students with no declared form of disability who were taking courses by distance learning in terms of their scores on an abbreviated version of the Academic Engagement Form. Students with a hearing loss obtained lower scores than students with no disability with regard to communication with other students, but some felt that communication was easier than in a traditional academic situation. Students who were postvocationally deaf had lower scores than students with no disability on learning from other students, but they obtained higher scores on student autonomy and student control. In general, the impact of a hearing loss on engagement in distance education is relatively slight.

Richardson and Woodley (1999) investigated approaches to studying in students with a hearing loss who were taking courses in higher education by distance learning. In general, these students seemed to be just as capable of adopting approaches to studying that were appropriate to higher education as were students with no disability. The students who had been deaf from childhood showed an overcautious reliance on details, and this was ascribed to the speech-based education to which most of these students would have been exposed. However, the most consistent result was that the students with a hearing loss showed an increased “fear of failure”: a concern with maintaining self-esteem as opposed to intrinsic or extrinsic motivation. The students’ comments suggested that this might be related to negative experiences with tutors or other students.

Unfortunately, little is known about how people with a hearing loss experience higher education (but see Lang, 2002). On the one hand, they are marginalized in the literature on deaf education. In the past, some commentators have given the impression that universities are places where hearing researchers explore the educational aspects of deafness, but not places where one might find any deaf students (Moores, 1990). It is still common to find books on deaf education that barely refer to higher education at all (see Gregory, Knight, McCracken, Powers, & Watson, 1998; Livingstone, 1997). On the other hand, students with a hearing loss are also marginalized in the literature on higher education. If they are mentioned at all, they are often discussed in the context of disablement (Wolfendale & Corbett, 1996), despite the fact that many deaf people see themselves as members of a distinct cultural and linguistic group and not as disabled. They may even be excluded from research on students with disabilities on the grounds that a loss of hearing is a less visible characteristic than most physical disabilities (e.g., Hurst, 1993, pp. 57–58).

In two early accounts, Bigman (1961) and Quigley, Jenné, and Phillips (1964) presented data from deaf people (and in the latter case from people who were
hard of hearing) who were taking courses at mainstream colleges and universities across the United States. More recently, Menchel (1998) interviewed 33 deaf students taking full-time courses at various institutions in New England. However, the lack of any comparison groups of hearing students in these studies makes it very hard to evaluate their findings. Most of the remaining research has been carried out with students at institutions in the United States (in particular, Gallaudet University and the National Technical Institute for the Deaf) that offer specially designed programs for which there is no direct counterpart in most other countries around the world (e.g., Foster & Walter, 1992). It is therefore not clear whether the findings of such studies would generalize to the experiences of students with a hearing loss taking courses in mainstream institutions of higher education.

Academic Engagement

Not all aspects of the experiences of students with a hearing loss are directly relevant to academic success in higher education. Spady (1970) and Tinto (1975; 1987, chap. 4) proposed that an important determinant of persistence or retention, as opposed to attrition or withdrawal, was the extent to which students were integrated into the academic structure and the social life of their institutions. Support for this analysis has come from a number of research studies (e.g., Christie & Dinham, 1991; Spady, 1971), and it has also been used to investigate other kinds of academic outcome, such as students’ self-reports of academic skill acquisition, their personal development, and their educational attainment (see Pascarella & Terenzini, 1991, pp. 51–53, 388–397, 616–626). Even so, the notion of academic integration or involvement is a very broad one that encompasses many aspects of students’ experiences (Astin, 1984; 1993, pp. 365–395).

In recent years, researchers have used the term “engagement” to refer to “the quality of effort students themselves devote to educationally purposeful activities that contribute directly to desired outcomes” (Hu & Kuh, 2002, p. 555). It is generally agreed that involvement in both the academic domain and the social domain is important for enhancing student engagement (Milem & Berger, 1997; Nora, 1993). Indeed, there is now a considerable amount of research evidence to show that the engagement or disengagement of students in higher education depends upon the quality of their formal and informal interactions both with faculty and with other students (see Hu & Kuh, 2002; Kraemer, 1997; Kuh & Vesper, 1997; McInnis, 2002; McInnis & James, 1995; McInnis, James, & Hartley, 2000; Nagda, Gregerman, Jonides, von Hippel, & Lerner, 1998; Tinto, 1993, chap. 4; Tinto, Goodsell-Love, & Russo, 1993; Volkwein & Carbone, 1994).

Unfortunately, accounts of academic integration, involvement, or engagement in higher education are poorly specified from a theoretical point of view insofar as they leave it implicit how successful engagement with learning activities relates to other psychological mechanisms that are known to affect academic outcomes. Skinner, Wellborn, and Connell (1990) reviewed the research literature concerned with the impact of perceived control upon academic attainment in compulsory education (e.g., Bandura, 1977; Seligman, 1975; Weiner, 1979). Most empirical investigations had examined the effects of children’s perceptions or expectations on their overt cognitive performance, as assessed by school grades or achievement tests. Nevertheless, Skinner et al. pointed out that most theoretical accounts had hypothesized that these effects were actually mediated by variations in academic engagement: In other words, children’s beliefs about control were assumed to influence their cognitive performance by either promoting or undermining their engagement in school-related activities.

Skinner et al. themselves carried out an investigation of 220 children and 12 teachers at one elementary school using the Rochester Assessment Package for Schools (RAPS; Wellborn & Connell, 1987). This contained a 100-item self-assessment form for children and a 10-item form to be used by teachers in order to evaluate each child’s engagement as opposed to disaffection. Consistent with the findings of many previous investigations, the data showed that the children’s ratings of their teacher’s behavior were highly correlated with the children’s self-ratings of their perceived control, and that the latter self-ratings were in turn highly correlated both with the children’s school grades and with their performance on standard
achievement tests. In addition, however, a path analysis demonstrated that the teachers’ ratings of the children’s engagement accounted for most of the relationship between the children’s self-ratings of perceived control and their attainment in terms of school grades and achievement test scores.

In short, the impact of variations in perceived control that resulted from the behavior of different teachers was largely mediated by changes in children’s academic engagement. Even so, Skinner et al. commented that the obtained correlations between perceived control and academic engagement were relatively modest, and they inferred that academic engagement also depended on self-system processes other than perceived control. In particular, they proposed that academic engagement depended in addition upon children’s perceived autonomy and upon their feelings of relatedness to others in the classroom. (Thus, for instance, high levels of perceived control would not be associated with academic engagement in children who felt either alienated or pressured to perform.) This is an important conclusion from a theoretical point of view, since it indicates that academic engagement is a multi-dimensional concept that is constituted by students’ perceptions of their teachers, of their peers, and of themselves as learners (see Astin, 1993, pp. 382–389).

Academic Engagement in Deaf Education

Long, Stinson, and Braeges (1991; Braeges, Stinson, & Long, 1993) noted that academic engagement had also been identified as a factor mediating the impact of perceived control upon attainment in deaf students (see Koelle & Convey, 1982). Nevertheless, they suggested that academic engagement would be influenced by the extent to which students felt that they could communicate effectively with their teachers and peers. Long et al. employed 15 items from the students’ self-assessment form in the RAPS to assess perceived academic engagement, and they administered this scale to 95 adolescents at an urban school for the deaf together with a second self-report instrument designed to measure their ease of communication in the classroom. They also asked the students’ teachers to complete the original 10-item engagement form from the RAPS about the students and to assess the students’ ease of communication in the classroom.

As predicted, the students’ ratings of their academic engagement were highly correlated with their ratings of their ease of communication in the classroom, and there was an analogous relationship between the teachers’ ratings of the students’ engagement and the teachers’ ratings of the students’ ease of communication. The teachers’ ratings of the students’ engagement also predicted the students’ current grade in English and their performance on standard achievement tests. However, the students’ ratings of their academic engagement were not significantly related either to the teachers’ ratings of their engagement or to their achievement test scores, and they were only weakly related to their current English course grade. Braeges et al. (1993) suggested that one reason for the failure of self-rated academic engagement to predict attainment was that prevalent norms inhibited students from admitting interest or involvement in academic aspects of school. Clearer relationships might therefore be apparent in a more academically orientated population.

Foster, Long, and Snell (1999) adapted the RAPS to produce the Academic Engagement Form (AEF), a questionnaire containing 114 items designed to assess affective and behavioral aspects of engagement in mainstream higher education. They compared the responses that were given to this instrument by 46 deaf students majoring in business studies, computer science, and information technology at the Rochester Institute of Technology (RIT) with the responses given by 30 hearing students who were majoring in the same disciplines. The two groups of students reported very similar levels of academic engagement, except that the deaf students perceived the pace of teaching as being less appropriate than did the hearing students, and they also tended not to feel as much a part of the institution as did the hearing students. Overall, these results suggest that deafness has relatively little impact upon academic engagement in higher education.

Nevertheless, it should be noted that the deaf students in the study by Foster et al. (1999) would have been receiving a high level of support from staff in the National Technical Institute for the Deaf, which is a constituent college of the RIT. This is likely to be a major factor in ensuring a high level of academic
engagement on the part of deaf students. Kersting (1997) interviewed 10 deaf students who had entered mainstream classes at the RIT directly and who had had little or no previous involvement in a deaf community. They reported considerable feelings of isolation, loneliness, and resentment (particularly during their first year of study). This was linked to alienation from and rejection by other deaf students and to separation and discrimination from hearing students, and it was exacerbated by features of the physical environment in which they had to live and study (such as segregated arrangements in their classrooms, dining facilities, and halls of residence). This is a very different picture, and it suggests that deaf students may exhibit reduced academic engagement in higher education unless they receive adequate support in their studies.

Academic Engagement in Distance Education

One major limitation of previous research on academic engagement in either deaf or hearing students in higher education is that it was concerned with young students at residential institutions where membership of a particular social community is an essential element of the educational experience. In the case of students who were older, who lived outside the institution, or who studied on a part-time basis, Bean and Metzner (1985) argued that other social systems (such as families, peer groups, or local communities) would be more important determinants of persistence, a point that was subsequently acknowledged by Tinto (1987, pp. 108, 124). The situation that is most radically different from full-time campus-based higher education is that of distance learning, in which the students are physically separated from their teachers, from their institutions, and often from other students, too (Kahl & Cropley, 1986). In this context, academic engagement will have to rely upon “noncontiguous” communication (Holmberg, 1981, p. 11).

In the 1980s, a number of attempts were made to apply Tinto’s (1975) model of student retention to the context of distance learning, with only limited success (Bernard & Amundsen, 1989; Sweet, 1986; Taylor et al., 1986). With hindsight, the main limitation of these studies is that they made little attempt to explore the actual experience of learning in distance education (see Cookson, 1989). Indeed, Tinto (1987, p. 211) made a similar criticism of research into student retention at two-year and nonresidential colleges in the United States. Nevertheless, several studies demonstrated that persistence in distance education depended less on academic factors than on nonacademic ones, such as students’ intentions, goals, and approaches to learning and the amount of personal support that they received from teachers, counselors, and family members (Billings, 1987; Gatz, 1986; Rekkedal, 1983; Siqueira de Freitas & Lynch, 1986).

Kember (1989) proposed that “academic integration” in distance education encompassed all the different facets of course delivery and that “social integration” depended upon the extent to which students were able to reconcile the demands of their courses with the commitments of their work, their families, and their social lives. Subsequently (Kember, 1995), he suggested that students who failed to achieve satisfactory academic or social integration would be less likely to achieve satisfactory performance, and that poor grades would in turn motivate them to withdraw from their studies. This entails that an adequate account of student persistence should also serve as a model of student progress. Kember devised a questionnaire to measure academic and social integration in distance education, and this had some success in predicting attainment and course completion among students in Hong Kong (Kember, 1995, chaps. 5, 11, & 12). However, other researchers were unable to replicate Kember’s findings (Woodley, de Lange, & Tanewski, 2001).

The physical separation between teachers and students in distance education often also implies a separation in time, that is, their communication is “asynchronous” (see Threlkeld & Brzoska, 1994). At a more fundamental level, the separation is often not simply geographical or temporal in nature, but social and personal as well (Keegan, 1990). To capture these different aspects of the relationships between teachers and learners in distance education, Moore (1980, 1983) used the term “transactional distance.” With regard to the multidimensional construct that was described by Skinner et al. (1990), it implies that academic engagement will depend on the autonomy of
the learners rather than on the quality of their relationships with teachers or peers. Indeed, the situation of distance education might tend to “level the playing field” between deaf and hearing students by removing the communication difficulties and social discrimination that tend to undermine the academic engagement of deaf students in campus-based higher education.

In fact, however, institutions of higher education offering programs by distance learning often make various arrangements to seek to narrow the transactional distance with their students. These can include tutorials or self-help groups arranged on a regional basis, induction courses or residential schools, and teleconferencing or computer conferencing. This means that faculty may have different roles in distance education: as authors of course materials or as tutors. At least in the case of hearing individuals, this kind of support seems to be highly valued by students (Fung & Carr, 2000; Hennessy, Flude, & Tait, 1999). Of course, the relevant technologies can be used to facilitate communication among the students themselves as well as between students and their teachers (Keegan, 1988). Indeed, the new forms of information technology that are employed to support students in distance education are being increasingly exploited in campus-based higher education, too. The limited amount of research evidence available suggests that their use serves to enhance the quality of learning and personal development (Kuh & Vesper, 2001).

In general, learning at a distance still necessitates some kind of communication between teachers and students, and the institutions responsible for distance education will tend to exploit whatever technologies are available to facilitate that communication (Garrison & Shale, 1987). Indeed, if anything, the introduction of new technologies in higher education is tending to blur the distinction between campus-based and distance education (Pascarella & Terenzini, 1998). On the one hand, this means that students’ academic engagement in distance education may be more dependent upon the quality of their relationships with their teachers and with other students. On the other hand, it also means that the academic engagement of students with a hearing loss may suffer as the result of communication difficulties and social discrimination. In short, a hearing loss may compound the physical and social isolation that is inherent in distance education.

The following study was therefore carried out in order to assess academic engagement in distance-learning students with and without a hearing loss. We identified a subset of 36 items in the AEF that seemed to reflect the different aspects of students’ experiences in distance education and reworded them if necessary for administration in the latter context. We administered the new scale to students with a hearing loss who were taking courses by distance learning with the Open University in the United Kingdom and also to a comparison group of hearing students who were taking the same courses. A factor analysis was carried out to identify the underlying dimensions of academic engagement, and the two groups of students were compared along these dimensions. We anticipated that ease of communication would contribute to academic engagement (see Long et al., 1991), but we were particularly interested in investigating whether students with a hearing loss exhibited a more generalized reduction in their academic engagement in distance education.

Method

Participants

The Open University delivers courses by distance learning across the United Kingdom, and it provides extensive human and technical support for people with a hearing loss. The target population for this study consisted of the 489 students who had confirmed their registration on one or more of the undergraduate courses offered by the University in the 1998 academic year and had identified themselves as having a hearing loss that might necessitate additional support in their studies. To maximize the response rate, 130 of the 489 students were omitted because they had participated in more than one previous survey during 1998. Since no other research was being carried out on students with a hearing loss at that time, it is reasonable to assume that the remaining 359 students were representative of the target population.

A comparison group was identified from students who had confirmed their registration on one or more of
the undergraduate courses offered by the Open University in 1998 but who had not declared any disability. For each student with a hearing loss, a comparison student was sought who was of the same age and gender, who had a similar level of academic qualifications before joining the University, and who was taking at least one of the same courses. In the case of younger students, it was often possible to match the students exactly by their year of birth; this proved more difficult in the case of the older students, and they were matched to within 5 years. By the time that the survey was to be carried out, 352 comparison students had been identified.

Instruments

A subset of 36 items was selected from the AEF as being especially relevant for students who were taking courses with the Open University, and these were adapted for use with students in distance education. In particular, it was necessary to remove references to “teachers” so that items referred to tutors or to teaching materials, as appropriate. Alternative wordings of the items were discussed with University staff responsible for the design of student surveys or the support of students with a hearing loss. Reference was also made to published recommendations for the construction of assessment materials for administration to people with a hearing loss (Nickerson, Zannettou, & Sutton, 1986; Vernon & Andrews, 1990, chap. 10) and for the translation of psychological tests in cross-cultural research (Van de Vijver & Hambleton, 1996). Both sources emphasize the use of simple vocabulary and syntax, the elimination of abstract or metaphorical constructions, and an appreciation of the different ways in which the sociocultural context can affect how participants respond to test instruments. All the items were changed in some way for use in this study: The revised items are presented in the “Results” section below.

Procedure

The selected items were included in a longer questionnaire that contained questions relating to demographic variables, academic experience, current and previous hearing ability, knowledge and use of sign language, previous education, use of human or technical support in University studies, and forms of disability other than a hearing loss. For each item, students were asked to judge how often the relevant statement had been true for them in their experience of studying with the Open University, using the following scale: 6, always; 5, almost always; 4, most of the time; 3, sometimes; 2, almost never; and 1, never. They were asked to think about their course(s) as a whole rather than about the individual units, topics, or tutors. Finally, they were asked open-ended questions about the advantages and disadvantages of distance learning.

A covering letter explained the purpose of the survey (and, for the students who had no declared form of disability, the need for a comparison group); students were assured that their responses would be anonymous and that no attempt would be made to identify any respondent. The questionnaire was mailed to students in early January 1999, shortly after they had received their results from the relevant courses, and a follow-up mailing was carried out toward the end of the same month. Questionnaires mailed to the two groups of students were printed on paper of different colors. Otherwise, no attempt was made to identify individual students.

Results and Discussion

A total of 269 students who had been recorded by the Open University as having a hearing loss returned their questionnaires, representing a response rate of 74.9%. Two of these respondents denied that they had a hearing loss (although both reported some other disability), and so they were dropped from the sample. A total of 242 students with no previously declared disability returned their questionnaires, representing a response rate of 68.8%. This was not significantly different from the response rate of the students with a hearing loss ($X^2(1) = 3.36, p > .05$), and the response rates of both groups would be considered good for a postal survey (see Babbie, 1973, p. 165; Kidder, 1981, pp. 150–151). Within the comparison group, 64 students identified themselves as having some form of disability (including, in 57 cases, a hearing loss), and these students were dropped from the following analyses. Finally, 28 students with a hearing loss and 12 students in the comparison group had failed to provide
a response to one or more of the 36 critical items, and so these students too were dropped from our analyses.

Accordingly, the final samples consisted of 239 students who had confirmed that they had a hearing loss and 166 students who had confirmed that they had no form of disability. Table 1 summarizes a number of personal characteristics of these two samples. (In each case, the relevant information was provided by respondents themselves.) They did not differ in terms of their gender distributions, $X^2(1) = 3.24, p > .05$. However, the students with a hearing loss were significantly older than those with no declared form of disability, $F(1,400) = 8.73, p < .005$ (missing data for 3 cases); this is probably the result of dropping students with disabilities from the comparison sample. Nearly all respondents in both samples had learned English as their first spoken language ($X^2(1) = 0.49, p > .40$). The respondents had been asked to compare their educational qualifications on joining the University with the most common university-entrance qualification in the United Kingdom, the General Certificate of Education, Advanced Level (A-level). Since the two samples had originally been matched in terms of their qualifications, it is not surprising that they did not differ on this basis ($X^2(2) = 1.21; p > .50$).

The final samples did not differ in the number of credit points that they had accumulated by the beginning of 1998, $F(1, 382) = 2.47, p > .10$ (missing data for 21 cases). (A total of 360 credit points is needed for the award of a Bachelor’s degree.) In addition, they did not differ in their current academic workload, determined by the total credit value of the courses that they had actually taken during 1998 ($X^2(3) = 2.68, p > .40$), in the distribution of those courses across the University’s main faculties ($X^2(3) = 1.04, p > .75$), or in the (highest) academic level of those courses ($X^2(2) = 0.06, p > .95$). In short, the two samples of students differed in their mean ages, but they were similar in terms of gender, first spoken language, previous qualifications, number of credit points already achieved, current academic workload, academic discipline, and level of study. (It was, of course, not possible to recover the matched nature of the original design, both because the final samples were of unequal size and because their responses were anonymous.)

Table 1 Characteristics of two student samples

<table>
<thead>
<tr>
<th></th>
<th>Hearing loss</th>
<th>No disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of respondents</td>
<td>239</td>
<td>166</td>
</tr>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>65.7%</td>
<td>74.1%</td>
</tr>
<tr>
<td>Male</td>
<td>34.3%</td>
<td>25.9%</td>
</tr>
<tr>
<td>Age (years):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>54.32</td>
<td>50.32</td>
</tr>
<tr>
<td>Range (22–86)</td>
<td>22–80</td>
<td></td>
</tr>
<tr>
<td>Other form of disability:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First spoken language:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>97.1%</td>
<td>95.8%</td>
</tr>
<tr>
<td>Other</td>
<td>2.9%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Previous qualifications:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than A-level:</td>
<td>39.7%</td>
<td>35.2%</td>
</tr>
<tr>
<td>A-level or equivalent:</td>
<td>43.0%</td>
<td>48.5%</td>
</tr>
<tr>
<td>Beyond A-level:</td>
<td>17.3%</td>
<td>16.4%</td>
</tr>
<tr>
<td>Open University credit points:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>175.8</td>
<td>196.1</td>
</tr>
<tr>
<td>Range (0–600)</td>
<td>0–600</td>
<td>0–660</td>
</tr>
<tr>
<td>Academic workload (credit points):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>28.8%</td>
<td>26.3%</td>
</tr>
<tr>
<td>60</td>
<td>65.3%</td>
<td>66.0%</td>
</tr>
<tr>
<td>90</td>
<td>2.3%</td>
<td>5.1%</td>
</tr>
<tr>
<td>120</td>
<td>3.7%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Academic discipline:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arts</td>
<td>39.7%</td>
<td>37.3%</td>
</tr>
<tr>
<td>Sciences (including Mathematics and Technology)</td>
<td>24.7%</td>
<td>22.3%</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>13.4%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Other</td>
<td>22.2%</td>
<td>25.9%</td>
</tr>
<tr>
<td>Academic level:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundation</td>
<td>18.7%</td>
<td>17.9%</td>
</tr>
<tr>
<td>Intermediate</td>
<td>47.0%</td>
<td>46.8%</td>
</tr>
<tr>
<td>Honors</td>
<td>34.2%</td>
<td>35.3%</td>
</tr>
</tbody>
</table>

The respondents were asked to describe their unaided hearing in each ear on a 6-point scale taken from Paul and Quigley (1990, p. 41): unimpaired, slightly impaired, mildly impaired, moderately impaired, severely impaired, or profoundly impaired. Within the group of students with a hearing loss, the modal response was a moderate impairment affecting both ears, but 53 (or 22%) of the students reported that they were either severely or profoundly impaired in both ears. In this sense, they could be described as being...
“deaf” as opposed to “hard of hearing.” Although 47 (or 20%) of the students with a hearing loss reported that their hearing had been impaired from birth or before the age of two (and so had a prelingual hearing loss), 142 (or 59%) of the students with a hearing loss reported that their hearing had become impaired after the age of 18 (and thus had a postvocational hearing loss). Only 13 (or 5%) of the students with a hearing loss reported that they knew sign language, and none of these students reported that they preferred to communicate using sign language rather than speech.

First-Order Factor Analysis

The responses to the 36 items from the AEF were subjected to a common factor analysis. First, a principal components analysis identified nine components with eigenvalues greater than one, and these explained 64.1% of the total variance. However, Cattell’s (1966) scree test suggested that 12 factors (explaining 72.0% of the total variance) should be extracted, and this idea was confirmed by Montanelli and Humphreys’ (1976) procedure, which is based upon the predicted eigenvalues of a random correlation matrix. Accordingly, a common factor analysis was carried out using principal axis factoring to extract 12 factors, with squared multiple correlations taken as the initial estimates of communality. The adequacy of this factor solution was assessed by determining the residuals between the original correlations among the scores on the 36 items and the estimated correlations reproduced from the factor loadings. Only 11 (or 1.7%) of these 630 residuals were greater than .05 in absolute magnitude, and none exceeded .10 in absolute magnitude. This shows that a 12-factor solution provided a good fit to the raw data. Finally, the extracted factor matrix was submitted to oblique rotation by a quartimin method.

For the presentation of the results, the 36 items are identified by their sequential order and are followed by their loadings on the relevant factors. Factor loadings greater than .30 in absolute magnitude were regarded as salient for the purposes of interpretation. The items that showed salient loadings on each factor are listed in decreasing order of the absolute magnitude of the loadings, and the factors were labeled on the basis of the content of the items with the highest loadings. It will be noted that the rotated solution exhibited “simple structure” in that 34 of the 36 items showed salient loadings and only four items (Items 25, 30, 34, and 35) showed salient loadings on more than one factor.

The first factor showed salient loadings on the following items, and it was labeled “Relations with Tutors”:

29. Tutors and students on OU [Open University] courses respect each other. (+.69)
1. Tutors on OU courses treat students fairly. (+.64)
28. Tutors and students on OU courses understand each other. (+.62)
2. Tutors on OU courses make it clear what they expect of students. (+.48)

The second factor showed salient loadings on the following items and was labeled “Student Autonomy”:

24. I can come up with my own solutions to problems. (+.95)
23. When I get stuck on a question, I can eventually work it out for myself. (+.78)
25. If I decide to learn something hard, I can do so. (+.38)

The third factor showed salient loadings on the following items and was labeled “Participation in Tutorials”:

18. I participate in tutorial discussions. (+.93)
16. I participate in tutorials when new material is being discussed. (+.90)
17. I pay attention when we start a new topic. (+.58)
30. I enjoy knowing the people on my course(s). (+.36)

The following item also showed its highest loading on this factor:

3. When I don’t understand something on an OU course, I ask the tutor. (+.23)

The fourth factor showed salient loadings on the following items and was labeled “Motivation to Learn”:

21. I care about learning new things. (+.88)
22. It’s important to me to learn about a topic. (+.76)
19. I care about understanding course material. (+.58)
20. I care about getting good grades. (+.57)

The fifth factor showed salient loadings on the following items and was labeled “Affiliation with Peers”:
31. The people on my course(s) are like a family. (+.90)
34. The people at the OU are like a family. (+.59)
35. I have a lot of friends in the OU. (+.37)
30. I enjoy knowing the people on my course(s). (+.37)

The sixth factor showed salient loadings on the following items and was labeled “Student Control”:
9. Tutors on OU courses let students decide things for themselves. (+.82)
10. Tutors on OU courses encourage students to do things their own way. (+.81)
8. Students on OU courses have a lot of choice about how they do their work. (+.50)
11. Tutors make us do everything their way. (–.50)

The seventh factor showed salient loadings on the following items, and it was labeled “Self-confidence”:
26. I can do well in my course(s) if I want to. (+.91)
27. I can get good grades in my course(s). (+.86)
25. If I decide to learn something hard, I can do so. (+.33)

The eighth factor showed salient loadings on the following items and was labeled “Tutor Pace”:
6. Tutors don’t go on to new things before they know that we understand the old ones. (+.88)
7. Tutors on OU courses make sure that they don’t teach faster than we can learn. (+.81)

The following item also showed its highest loading on this factor:
12. I learn most from my tutors. (+.20)

The ninth factor showed salient loadings on the following items and was labeled “Learning from Other Students”:
13. I learn most from other OU students. (+.84)
4. When I don’t understand something on an OU course, I ask another student. (+.82)
35. I have a lot of friends in the OU. (+.36)

The tenth factor showed salient loadings on the following items and was labeled “Lack of Communication”:
15. I wish I could communicate more with other OU students. (+.63)
32. The OU makes students feel isolated. (+.36)

The eleventh factor showed salient loadings on the following items and was labeled “Institutional Affiliation”:
36. I’m proud to be an Open University student. (+.66)
33. I feel like I belong to the Open University. (+.62)
34. The people at the OU are like a family. (+.31)

The twelfth factor showed salient loadings on the following items and was labeled “Learning from Materials”:
14. I learn most from the course materials. (+.64)
5. When I don’t understand something on an OU course, I read the course materials. (+.58)

Twelve factor-based scales were constructed by computing the respondents’ mean scores across mutually exclusive and jointly exhaustive subsets of the 36 items from the AEF. The composition of these 12 scales and their internal consistency, as indicated by Cronbach’s (1951) coefficient alpha, were as follows:

- Affiliation with Peers (Items 30, 31, 34, and 35) (alpha = .84);
- Communication (Items 15 and 32 coded in reverse) (alpha = .34);
- Institutional Affiliation (Items 33 and 36) (alpha = .65);
- Learning from Materials (Items 5 and 14) (alpha = .59);
- Learning from Other Students (Items 4 and 13) (alpha = .80);
- Motivation to Learn (Items 19, 20, 21, and 22) (alpha = .81);
Participation in Tutorials (Items 3, 16, 17, and 18) (alpha = .77);
Relations with Tutors (Items, 1, 2, 28, and 29) (alpha = .78);
Self-confidence (Items 26 and 27) (alpha = .88);
Student Autonomy (Items 23, 24, and 25) (alpha = .81);
Student Control (Items 8, 9, and 10, plus Item 11 coded in reverse) (alpha = .77); and
Tutor Pace (Items 6, 7, and 12) (alpha = .70).

The scores on all but one of these factor-based scales showed a level of internal consistency which was satisfactory by conventional psychometric criteria (see Robinson, Shaver, & Wrightsman, 1991). The one exception was the Communication scale, which was constituted by just two items, only one of which had shown a substantial loading on the relevant factor in the results of the factor analysis described earlier.

Second-Order Factor Analysis

The correlation matrix among the scores on the 12 factor-based scales was significantly different from an identity matrix ($p < .001$). Consequently, it was appropriate to carry out a second-order factor analysis on the scores obtained on the first-order factor-based scales to identify more global dimensions underlying the students’ responses. A principal components analysis identified three components with eigenvalues greater than one, and these explained 52.0% of the total variance. The idea that three factors should be extracted was confirmed by Cattell’s (1966) scree test and by Montanelli and Humphreys’ (1976) procedure. A common factor analysis was accordingly conducted using principal axis factoring to extract three factors with squared multiple correlations as the initial estimates of communality. Finally, the extracted factor matrix was submitted to oblique rotation by a quartimin method.

The first second-order factor showed salient loadings on Affiliation with Peers (+.83), Learning from Other Students (+.61), Participation in Tutorials (+.47), and Institutional Affiliation (+.39); it was labeled “Role of Peers.” The second second-order factor showed salient loadings on Student Autonomy (+.73), Self-confidence (+.54), Learning from Materials (+.49) and Motivation to Learn (+.48); it was labeled “Role of Self.” The third second-order factor showed salient loadings on Relations with Tutors (+.85), Tutor Pace (+.65), and Student Control (+.44). The Communication scale also showed its highest loading (+.21) on this factor, and it was labeled “Role of Tutors.” The Role of Tutors factor showed a modest positive correlation with both the Role of Peers factor ($r = +.40$) and the Role of Self factor ($r = +.25$); however, the two latter factors were essentially independent of one another ($r = +.02$).

Accordingly, three second-order factor-based scales were constructed by computing the respondents’ mean scores across mutually exclusive and jointly exhaustive subsets of the 12 first-order factor-based scales: Role of Peers (Affiliation with Peers, Institutional Affiliation, Learning from Other Students, and Participation in Tutorials); Role of Self (Learning from Materials, Motivation to Learn, Self-confidence, and Student Autonomy); and Role of Tutors (Communication, Relations with Tutors, Student Control, and Tutor Pace). The scores on these three scales showed satisfactory internal consistency (alpha = .70, .62, and .56, respectively).

Group Differences

Table 2 shows the mean scores obtained by the students with a hearing loss and by the students with no declared form of disability on the 12 first-order factor-based scales and on the three second-order factor-based scales. The two samples produced similar mean scores on the second-order factor-based scales, and a multivariate analysis of variance showed that there was no significant difference between the mean scores of the two groups, $F(3, 410) = 0.63, p > .50$.

However, a second multivariate analysis of variance showed that there was a significant difference between the two groups in terms of their scores on the first-order factor-based scales, $F(12, 392) = 2.78, p < .002$. Univariate analyses showed that the two groups of students were significantly different in their scores on Motivation to Learn, $F(1, 403) = 4.27, p < .05$, and on Communication, $F(1, 403) = 14.32, p < .001$, but not on any of the other 10 scales, $F(1, 403) \leq 2.18, p > .10$, in each case. Table 2 shows that the students with
a hearing loss obtained lower scores than the students with no declared form of disability on Communication but higher scores than the students with no declared form of disability on Motivation to Learn.

Comparisons may be statistically significant but of little practical importance, especially if large numbers of participants are involved. This can be addressed by computing a measure of the size of the effect in question (Richardson, 1996). When two different groups are compared, the most common index of effect size is obtained by standardizing the difference between their means against the pooled within-group standard deviation; thus, an effect size of 0.5 means that the two groups differ by an amount equal to one half of their standard deviation. Table 2 shows the standardized mean differences for the different scales, corrected for sampling bias. An effect size is significantly different from zero if and only if the relevant group means are significantly different from each other. Cohen (1969, pp. 22–24) proposed that effect sizes of 0.2, 0.5, and 0.8 be described as “small,” “medium” and “large.” The difference between the two groups on Communication approached a medium effect size in these terms, the difference on Motivation to Learn was only a small effect, and the remaining effects were both nonsignificant and small.

Subgroup Differences

The scores obtained by the students with no declared form of disability were compared with those obtained by eight subgroups of students with a hearing loss defined by three binary variables: deaf (severe or profound bilateral loss) versus hard of hearing; prevocational versus postvocational hearing loss (onset before or after the age of 18); and presence versus absence of another disability. Significant differences among these subgroups might be due to uncontrolled variation in their age, previous education, experience of Open University courses, or academic discipline. Discipline (Arts, Social Sciences, Sciences, and Other) was thus used as an additional factor, and age, prior qualifications, and Open University credit points were used as covariates.
A multivariate analysis of variance was carried out on the respondents’ scores on the 12 first-order factor-based scales using this design. One student had not reported the age of hearing loss onset, and 27 students had missing values on one or more of the remaining variables; accordingly, the analysis was based on a total of 378 students. This analysis confirmed that there was a significant difference between the students with a hearing loss and the students with no declared form of disability, $F(12, 330) = 5.32, p < .05$. There was also a significant difference between the students with prevocational hearing loss and those with postvocational hearing loss, $F(12, 330) = 2.00, p < .05$. Finally, the difference between the deaf students and the hard of hearing students was marginally significant, $F(12, 330) = 1.68, p < .10$, as was the interaction between the last two effects, $F(12, 330) = 1.58, p < .10$.

In this analysis, none of the terms involving the presence or absence of another disability was statistically significant, and so the latter was dropped from univariate analyses carried out on the individual scales. The univariate analyses compared the scores of the students with no declared disability with those of four subgroups of students with a hearing loss defined by two variables: level of hearing loss (deaf vs. hard of hearing); and age of onset (prevocational vs. postvocational). Once again, discipline was used as an additional factor, and age, prior qualifications, and Open University credit points were used as covariates. Simple contrasts were used to compare each of the four subgroups of students with a hearing loss with the comparison group of students who had no declared form of disability while controlling for the effects of the remaining variables.

Table 3 shows the mean scale scores of the five subgroups of students, adjusted for the effects of discipline, age, prior qualifications, and credit points. Comparisons that were statistically significant using two-tailed tests are marked by asterisks. The results confirm the general trend of the students with a hearing loss to obtain lower scores than the students with no declared form of disability on the Communication scale, although this effect did not reach significance in the case of the students who were prevocationally hard of hearing. In addition, the

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<td>1.94*</td>
<td>2.63</td>
<td>2.27</td>
<td>2.51</td>
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<td>4.32</td>
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<td>Overall</td>
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<td>3.83</td>
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<td>Overall</td>
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<td>Communication</td>
<td>3.35*</td>
<td>3.32*</td>
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<td>Student Control</td>
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<td>Tutor Pace</td>
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<td>3.41</td>
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<tr>
<td>Overall</td>
<td>3.70</td>
<td>3.99</td>
<td>3.94</td>
<td>3.80</td>
<td>3.89</td>
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Note. Prevoc. = prevocational hearing loss; postvoc. = postvocational hearing loss. Mean scores are adjusted for the effects of discipline, age, prior qualifications, and number of credits gained. Asterisks indicate mean scores that are significantly different from those obtained by students with no declared form of disability using $\alpha = .05$. 

Table 3 Adjusted mean scores by level and age of onset of hearing loss
students who were postvocationally deaf obtained higher scores than those with no declared form of disability on the Student Autonomy and Student Control scales, but they obtained lower scores than those with no declared form of disability on the Learning from Other Students scale. No other comparisons were significant when the possible effects of discipline, age, previous qualifications, and credit points had been statistically controlled.

Responses to Open-Ended Questions

The replies given to the open-ended questions by the 511 respondents were categorized and compared between the 267 students who confirmed that they had a hearing loss and the 178 students who confirmed that they had no form of disability. In the following account, illustrative examples have been selected from the responses given by the students with a hearing loss.

Students were asked to complete the following sentence in their own words: “Learning at a distance has the following ADVANTAGES for me.” Students in both groups reported that the flexibility of distance learning was its main advantage: Sixty-seven percent of the students with a hearing loss and 64% of the students with no reported disability mentioned being able to study at my own pace, scheduling my study time around work or family, or being able to concentrate on the material as significant advantages of distance learning.

Two particular responses from students with a hearing loss capture the flexible nature of distance learning:

- Learn at my own pace/quiet environment for study/flexible timetable for study and leisure.

- It is very flexible as I work full time and I work horrenous shifts.

In addition, 13% of the students with a hearing loss and 39% of the students with no reported disability indicated that an advantage of distance learning was that it didn’t interfere with other aspects of their lives such as jobs, families, or (in some students with a hearing loss) a disabling condition. The following quotations from students with a hearing loss illustrate this point:

I have a very large family so I have to fit in learning around them.

Being in a wheelchair I don’t have to worry too much about access to places of study.

A third advantage of distance learning was unique to students with a hearing loss: Twenty percent indicated that communication was easier than in a traditional classroom setting. The following quotations are representative:

- Don’t have to be embarrassed because can’t hear and misinterpret what others are saying.

- I receive all the information without struggling to hear it and take notes.

- It enables me to concentrate on the material, not on hearing/lipreading the teacher/tutor.

- Most of the interaction is with written course materials where my deafness is not a handicap.

- Less stress of classroom structure and inability to hear and participate.

In short, it would seem that distance learning allowed both groups of students to structure their learning in ways that minimized interference from domestic or occupational responsibilities. In addition, for some students with a hearing loss, it lessened the burden of communication or at least avoided situations in which communication had been problematic in the past.

The students were also asked to complete the following sentence in their own words: “Learning at a distance has the following DISADVANTAGES for me.” Roughly the same proportions of students with (18%) and without (19%) a hearing loss said that there were no disadvantages associated with distance education. In those who did experience some kind of disadvantage, 39% of the students with a hearing loss and 36% of the students with no reported disability reported that feeling isolated was the greatest disadvantage. This sense of isolation is conveyed in the following comments from students with a hearing loss:

- I sometimes feel isolated and my deafness prevents me from making the contact that most other students do.
I cannot use a telephone to contact a tutor.

I miss the support of and sharing with other students experienced in my previous adult education (diploma in social work).

In addition, 13% of the students with a hearing loss and 8% of the students with no reported disability reported problems in attending tutorial sessions because of the distance from home, their occupational responsibilities, or difficulties related to having a hearing loss. In other words, both groups of students expressed concerns about feeling isolated from other students and the logistics of attending their regular tutorial sessions.

Conclusions

The AEF was developed by Foster et al. (1999) to evaluate the affective and behavioral aspects of academic engagement in deaf and hearing students taking courses in campus-based institutions of higher education. The present study has shown that a subset of 36 items from the AEF provides a coherent account of academic engagement in students taking courses by distance learning. These findings support the position adopted by Kember (1989, 1995) that the academic integration of students into their institutions is as important a factor in distance education as it is in campus-based higher education. The results of the factor analyses also confirm the suggestion made by Skinner et al. (1990) that academic integration is a multi-dimensional construct that is based upon students’ perceptions of their teachers, of their peers, and of themselves as learners.

In the context of distance education, the picture that emerges (see Table 2) is of highly motivated students who learn most from their course materials rather than their tutors or other students. They also feel a strong sense of institutional affiliation and are proud to be students of their university. At the same time, they acknowledge the difficulty of enjoying effective communication with other students, particularly in maintaining personal relationships and in sharing information about their courses. Indeed, their responses to the two open-ended questions that were included in our survey generally confirmed the notion that distance learning is characterized by physical and social isolation (Kahl & Cropley, 1986; Pugliese, 1994, 1996).

The main aim of this study was to compare academic engagement in students with and without a hearing loss taking courses by distance learning. The most consistent finding was that students with a hearing loss obtained lower scores than students with no disability on a scale that measured effective communication with other students. This scale showed its highest loading on the second-order factor concerned with the students’ perceptions of their tutors, which suggests that communication among students may be encouraged or disrupted by the way in which tutors manage their social interactions during tutorials (see Bruffee, 1999). Not surprisingly, the trend of students with a hearing loss to obtain lower scores on this scale was more pronounced in students who were classified as “deaf” than in those who were classified as “hard of hearing” (see Table 3). Even so, the size of the effect was only “moderate” according to Cohen’s (1969) criteria.

In addition, some of the students with a hearing loss indicated that communication in distance education was easier than in a campus-based setting. They referred in particular to the problems that they would otherwise experience in working out what teachers and other students were saying, the practical difficulties of taking notes and following lectures at the same time, and, in general, the stress of being in a situation where they could not participate as an equal member of the class. In short, despite (or, rather, because of) the physical and social isolation inherent in distance education, students with a hearing loss were able to avoid the problems of communication and participation associated with learning in a traditional setting.

The students with a hearing loss tended to obtain higher scores than the students with no disability on a scale that measured motivation to learn. However, this difference was no longer statistically significant when the effects of background variables had been taken into account. (It is probably due to the fact that the students with a hearing loss tended to be older than those with no disability.) When the effects of these background variables had been statistically controlled, those students who were postvocationally deaf obtained
lower scores than the students with no disability on a scale that measured learning from other students, but they obtained higher scores on scales that measured student autonomy and student control. These students had apparently responded to the onset of deafness in adult life by adopting a self-reliant approach to learning.

Given the findings obtained by Long et al. (1991) and by Kersting (1997) in the context of campus-based higher education, we had anticipated that a hearing loss might compound the physical and social isolation inherent in distance education and that communication difficulties experienced by students with a hearing loss would lead to a more generalized reduction in their academic engagement. In fact, the most striking feature of the present results is the remarkable similarity between the scores obtained on the AEF by the students with a hearing loss and those obtained by their peers with no reported disability. Indeed, with regard to global dimensions of academic engagement (as measured by their scores on the second-order factor scales defined in this study), there were no significant differences at all between the two groups (see Table 2).

The results of our investigation therefore tend to confirm a very old idea in the limited research literature on students with a hearing loss in higher education: For those students with a hearing loss who have the ability to gain access to higher education, the major obstacles to successful attainment are difficulties in communication rather than the academic demands of their courses (Breunig, 1965; Moores, 1987, p. 327). Indeed, the situation of distance education does appear to “level the playing field” between deaf students and hearing students by alleviating the communication difficulties and the social discrimination that would undermine the academic engagement of students who are deaf or hard of hearing in campus-based higher education.

Of course, our findings might have been different if our sample of students with a hearing loss had included any students who relied on sign language as the medium of communication. If there are sufficient numbers of such students taking a particular course, the Open University can arrange residential schools where they can work together. Otherwise, their interactions in tutorials will be mediated by interpreters and note takers. In distance education, such students are at least able to engage with the syllabus directly through paper-based or electronic materials, but many will still be at a disadvantage insofar as they have to study and be assessed in a second language (Richardson & Woodley, 2001; see Ekins, 1992). These issues need to be examined in future research at institutions that recruit significant numbers of students who use sign language.

In the present investigation, both the students with a hearing loss and the students with no disability perceived the flexibility of distance learning as a primary advantage that allowed them to integrate higher education with their domestic and occupational responsibilities. The primary disadvantage of distance education was the sense of isolation both from teachers and from other learners that it fosters. Nowadays, distance education is rapidly evolving through the exploitation of new forms of information technology, such as computer conferencing and dedicated websites (see Bonk, 2001). This process of evolution should seek to preserve the flexibility that is valued by students but also ensure that all students have equal access to the information and enhanced communication that it can provide. It will thus enable a level of interaction that will encourage a sense of belonging to a community of learners who are faced with shared intellectual challenges.

Appendix

The Open University

The Open University was established in 1969 to provide degree programs by distance education throughout the United Kingdom. Originally, nearly all its courses were delivered by specially prepared correspondence materials, combined with television and radio broadcasts, video and audio recordings, tutorial support at a local level, and (in some cases) week-long residential schools. Nevertheless, in recent years, the Open University has made increasing use of computer-based support, particularly CD-ROMs, dedicated websites, and computer-mediated conferencing. It accepts all applicants over the normal minimum age of 18 without imposing any formal entrance requirements, subject only to limitations of numbers on particular courses.
Most Open University courses are weighted at either 30 or 60 credit points, on the basis that full-time study consists of courses worth 120 credit points in each academic year. Students are permitted to register for two or more courses in any year up to a maximum load of 120 credit points, but the vast majority register for just one course at a time. Courses in the University’s undergraduate program are classified as introductory, intermediate, or honors, but the program is a highly modular scheme in which any prerequisite requirements are minimized. Most courses are assessed by a combination of coursework (submitted by post or in some cases by electronic mail) and traditional unseen examinations (taken at regional assessment centers).

Students enroll for individual courses rather than for entire degree programs, and they qualify for a degree when they have obtained the appropriate total number of credit points. A minimum number of credit points from courses at honors level is required for the award of a degree with honors. Initially, the Open University offered a single undergraduate degree, the Bachelor of Arts, to cover all disciplines. In 1986, however, the Bachelor of Science degree was introduced, and since this study was carried out a range of named degrees has been introduced.

From its inception, the Open University has been committed to promoting opportunities for students who have disabilities. Its various resources for students with a hearing loss include induction courses on study skills, subtitled video recordings, transcripts of broadcast programs, and the loan of radio aids and other technical equipment. The University also arranges for sign language interpreters, oral interpreters, and note takers to support students at their tutorials and residential schools. It has even undertaken an experiment on providing for student assessment through the medium of British Sign Language. Both the representation and the performance of students with different kinds of disability are regularly monitored for institutional purposes.

References


Received October 7, 2002; revisions received January 28, 2003; accepted May 6, 2003.