Research Notes

Factors Related to Frequency of Use of CD-ROM: A Study of ERIC in an Academic Library

Anne-Marie Bélanger and Sandra D. Hoffman

This study investigated some of the factors associated with frequency of use of ERIC CD-ROM, including gender, age, level of familiarity with computers, and level of study. During the winter semester of 1988, 231 education students from Concordia University were surveyed. The instrument used was a mailed questionnaire, which elicited a 63.6% rate of return. The analyses carried out included frequencies of variables and cross-tabulations, using chi-square to test for independence between variables. All factors were found to be statistically significant with the exception of level of study. Since the results obtained for gender were strong, further analysis was carried out controlling for gender.

INTRODUCTION

With the emergence of new information technology, library users are increasingly involved in the use of computers. Although computers were originally used primarily in technical services, online circulation systems, online catalogs, and CD-ROMs are now increasingly available for use by the public.

Among the first CD-ROM products was the ERIC database, an index of educational resources published in paper as *Current Index to Journals in Education* and *Resources in Education*. ERIC CD-ROM was introduced by SilverPlatter in 1986, and Concordia University Libraries acquired it in February 1987. Through our work at the reference desk and through the response of education students to the "library experience," a library exercise many education teachers require students to complete as part of their course, we became aware that students required various levels of training. Since this instruction would be added to the work load of existing reference staff, it seemed important to determine if there were identifiable groups for whom instruction could be designed. To begin our research, we decided to investigate some of the factors that might be correlated to frequency of use of CD-ROM. This paper describes a pilot project conducted with education students at Concordia University and reports the results of our preliminary analysis.

REVIEW OF THE LITERATURE

Studies on user reaction to CD-ROM products are beginning to appear in the lit-

Anne-Marie Bélanger, now Cataloguing Librarian, was Acting Education Librarian at Norris Library, at the time of this study. Sandra D. Hoffman is Commerce Librarian at Norris Library, Concordia University, Montreal, Canada QC H3G 1M8.

erature[1]; however, none has addressed specifically frequency of use of CD-ROM. Studies of online catalogs are numerous, however, and since online catalogs are a related technology, some of these findings were of interest to us.

A landmark study by Matthews and Lawrence surveyed sixteen different online systems in twenty-nine libraries and more than 8,000 users and 4,000 nonusers.[2] A combination of research methods consisting of surveys, online monitoring, focus group interviews, and feature analysis were used. This study found that "age, sex, education level, academic discipline and academic affiliation appear to be associated with frequency of library, online and other catalog use."[3] Prior experience with computers was not found to be a significant variable for users of online catalogs. However, Matthews also found that "non-users have had much less experience with other computer systems when compared to users of the online catalog."[4] In Lolley's study of university students' use of automated and card catalogs, he concluded that perhaps "a significant factor in the acceptance and use of the on-line catalog is previous experience with computers either in the work or home environment. Almost 60% of the students responding to the survey indicated such previous experience."[5] Because opinion is divided and available research is on another technology (online catalogs), it seemed appropriate to investigate the influence of previous computer experience or computer-related skills on frequency of use of CD-ROM.

Among other factors, student status, age, and sex were studied. Student status, identified by Matthews as a significant factor affecting online catalog use, had also been examined in an academic setting by Pease and Gouke.[6] Although neither study compared frequency of use of online catalogs by graduates and undergraduates, this was identified as an important factor for the purposes of our study.

Age was a variable looked at by both Lolley and Matthews. Lolley found that students under thirty preferred the online catalog over the card catalog, and Matthews noted that "non-users are slightly older than users of the online catalog."[7]

Collis examined sex differences in attitudes toward computers of 3,000 young adults and found that "males are consistently more positive about using computers than are females, and more likely to express interest and pleasure in using a computer."[8] Therefore, females may be less frequent users of ERIC CD-ROM than males.

PROBLEM TO BE STUDIED

The purpose of the investigation was to determine if the frequency of student use of ERIC CD-ROM could be correlated to: (1) gender, (2) age, (3) range (extent) of experience with computers, and (4) student status. Since ERIC is an index of educational resources, our investigation was limited to use by education students.

In order to determine if the above factors were related to the use of ERIC CD-ROM, the following hypotheses were tested:

1. There is a statistically significant relationship between frequency of use of ERIC CD-ROM and gender.
2. There is a statistically significant relationship between frequency of use of ERIC CD-ROM and age.
3. There is a statistically significant relationship between frequency of use of ERIC CD-ROM and level of familiarity with computers.
4. There is a statistically significant relationship between frequency of use of ERIC CD-ROM and level of study.

DEFINITIONS

Some of the variables identified are described in further detail. The level of familiarity with computers was defined in terms of the following nine factors: (a) use of a computer at home; (b) use of a computer at work; (c) use of a computer in a place other than home or work, e.g., a friend's place, the university, a public library, etc.; (d) use of a computer for programming; (e) use of a computer for word processing; (f) use of educational software; (g) use of computer games; (h) having taken a computer course; (i) familiarity (level of ease/unease) with the computer keyboard. The level of familiarity with

computers was measured in terms of an aggregate score.

Student status was defined as undergraduate, master's, and doctoral. Within the undergraduate level were included all students registered in a program leading to a B.A. in Education and all students enrolled in the program leading to the Concordia University Certificate in Education. The graduate level was broken down into two groups, master's and doctoral candidates. The master's category included diploma students.

SIGNIFICANCE OF THE PROBLEM TO BE STUDIED

To date, few research studies have been published analyzing use of CD-ROM technology. End-user training is often mentioned as an area of concern because it is so time-consuming.[9] Since most libraries have limited human and material resources, the results of this study may enable libraries to design workshops that target groups of students (e.g., older, female, undergraduate). If groups can be identified, it would be possible to tailor content and level of instruction to their needs. For example, if undergraduate students constitute a significant group of infrequent users, it may be advisable to include instruction in core undergraduate education courses. If females or mature students are infrequent users, workshops limited to these sex/age groups may be tailored to their needs. If familiarity with computers is an important factor in frequency of use, workshops may need to be designed and advertised as including a basic introduction to computers.

SAMPLING AND METHODOLOGY

The methodology used was a survey consisting of a mailed questionnaire dealing with frequency of use of ERIC CD-ROM. The population studied was students from the Education Department of Concordia University. For purposes of this study, students were grouped into three categories as outlined in table 1.

The size of each of our populations was determined by adding the number of part-time and full-time students within each group. Our sample size was determined by using the table published by Krejcie and Morgan.[10] When we selected our random sample, we chose an equal number of part-time and full-time students at the undergraduate level, given that numbers of part-time and full-time students were almost equal at this level of study. All doctoral-level students were included in the sample.

To ensure an adequate return of the questionnaire, two mailings were planned and carried out. Of the 361 questionnaires mailed, 231, or 63.6%, were returned. As an incentive for the students to return the questionnaire, we offered to those willing to include their names, addresses and telephone numbers an opportunity to participate in a drawing for two gift certificates to be used at a local bookstore.[11]

A pretest of the survey instrument was carried out using a sample of twenty-five students. The wording of several questions was changed to clarify the meaning, based on the suggestions of two experienced researchers.[12] The revised questionnaire was pretested again using a sample of fourteen staff members.

DATA ANALYSIS

The SPSS/PC+ statistical package was used to analyze the data collected in our study. Missing cases were accounted for in all the statistical procedures. Frequen-

TABLE 1

STUDENT ENROLLMENT, SAMPLE SIZE, AND QUESTIONNAIRES RETURNED

Level of Study	Student Enrollment		Sample Size		Questionnaires Returned	
	Number	%	Number	%	Number	%
B.A. and Certificate	264	47	160	44	88	38
Diploma and Masters	277	50	184	51	128	55
Ph.D.	17	3	17	5	13	6
No status given	—	—	—	—	2	1
Total	558	100	361	100	231	100

cies, the first analysis carried out on the data, tabulated the number of responses in any one category. These were reported in percentages.

The second analysis carried out on the data was cross-tabulation, using chi-square to test for independence between variables. The variable frequency of use of ERIC CD-ROM was tested for possible association with the following variables: age, gender, level of familiarity with computers, and level of study. The level of significance chosen for this study was .05.

In addition to the chi-square analysis, the strength of the relationships was tested in the following manners: hypothesis 3 was tested using Somers' D; hypotheses 1 and 4 were tested using Cramer's V; and hypothesis 2 was testing using Kendall's Taub.[13]

RESULTS

When frequency of ERIC CD-ROM use was cross-tabulated with gender, age, and, level of familiarity with computers respectively, the results of the chi-square tests were all significant at a level of at least .05. The hypotheses were accepted at this level of significance.

When frequency of ERIC CD-ROM use was cross-tabulated with level of study, the result of the chi-square test was significant at a level of .0565. Consequently, the hypothesis was rejected; i.e., no significant relationship was found between level of study and frequency of ERIC CD-ROM use (see table 7).

DISCUSSION

The value of Cramers' V for the frequency of CD-ROM use by gender in table 2 is .25735. This value, in conjunction with a chi-square significance level of .0016, suggests that a fairly strong relationship exists between a student's gender and frequency of CD-ROM use. The correlation between gender and frequency of use is evident at all levels (see table 2), but is most marked at the level of greatest use. As expected from the literature, men were more likely to use and continue to use ERIC CD-ROM. Matthews found that "the typical user of the online catalog is male."[14] Given the strong correlation between gender and frequency of use, when analyzing the relationship between frequency of use and other factors (e.g., age, status, etc.), we analyzed males and females independently as well, in order to see whether apparent correlations with other factors might actually be indirect gender effects. The data for these analyses are reported in tables 4, 6 and 8.

From table 3 we see that there is a statistically significant relationship between age and frequency of CD-ROM use in the total population. However, when age and frequency of use are analyzed controlling for gender, results are statistically significant only for females (table 4). That is, when age and frequency of use are tabulated separately for males and females, only the relationship between females and frequency of use is significant at the .05 level. Although the results for males were

TABLE 2

CROSS-TABULATIONS FREQUENCY OF CD-ROM USE BY GENDER

CD-ROM Use	Count / Column %	Gender F	Gender M	Row Total
Never		94	20	114
		54.0%	35.1%	49.4%
Once		19	4	23
		10.9%	7.0%	10.0%
2–5 times		42	15	57
		24.1%	26.3%	24.7%
6 or more times		19	18	37
		10.9%	31.6%	16.0%
Column Total		174	57	231
		75.3%	24.7%	100.0%

Number of Missing Observations = 0 Chi-Square = 15.29926 df = 3 Significance = .0016 Cramer's V = .25735

TABLE 3

CROSS-TABULATIONS FREQUENCY OF CD-ROM USE BY AGE

CD-ROM Use	Count / Column %	Age: to 24	25–34	35–44	45 and older	Row Total
Never		22	34	43	14	113
		43.1%	41.5%	66.2%	43.8%	49.1%
Once		6	6	5	6	23
		11.8%	7.3%	7.7%	18.8%	10.0%
2–5 times		17	24	9	7	57
		33.3%	29.3%	13.8%	21.9%	24.8%
6 or more times		6	18	8	5	37
		11.8%	22.0%	12.3%	15.6%	16.1%
Column total		51	82	65	32	230
		22.2%	35.7%	28.3%	13.9%	100.0%

Number of Missing Observations = 1 Chi-Square = 17.26492 df = 9 Significance = .0447 Kendall's Tau B = −.08783

TABLE 4

CROSS-TABULATIONS FREQUENCY OF CD-ROM USE BY AGE CONTROLLING FOR GENDER

CD-ROM Use	Count / Column %	Age: to 24	25–34	35–44	45 and older	Row Total
Never	Female	21	29	31	12	93
		44.7%	48.3%	77.5%	46.2%	53.8%
	Male	1	5	12	2	20
		25.0%	22.7%	48.0%	33.3%	35.1%
Once	Female	5	4	5	5	19
		10.6%	6.7%	12.5%	19.2%	11.0%
	Male	1	2	0	1	4
		25.0%	9.1%	0.0%	16.7%	7.0%
2–5 times	Female	16	18	3	5	42
		34.0%	30.0%	7.5%	19.2%	24.3%
	Male	1	6	6	2	15
		25.0%	27.3%	24.0%	33.3%	26.3%
6 or more times	Female	5	9	1	4	19
		10.6%	15.0%	2.5%	15.4%	11.0%
	Male	1	9	7	1	18
		25.0%	40.9%	28.0%	16.7%	31.6%
Column total	Female	47	60	40	26	173
		27.2%	34.7%	23.1%	15.0%	100.0%
	Male	4	22	25	6	57
		7.0%	38.6%	43.9%	10.5%	100.0%

Female: Chi-Square = 19.77204 Male: Chi-Square = 8.15426
Significance = .0194 Significance = .5187
Kendall's Tau B = −.12299 Kendall's Tau B = −.14104
NOTE: Column percentages are calculated separately for female and male respondents.

not statistically significant, we examined the data to identify trends.

The strength of the relationship between frequency of use and age of females is a fairly weak, negative association, as indicated by the value of Kendall's Tau B of −.12299. That is, frequency of use is inversely associated with age in females.

For men, if we combine the frequency-of-use categories of 2–5 times and 6 or more times across the age groupings, we see that use of CD-ROM two or more times holds fairly constant at approximately 50% across the table, with the exception of the 25-to-34 age grouping. Here the percentage increases to 68.2%. The men in this age group may be full-time students who have more discretionary

time than working students who study part-time, or they may be enrolled in computer-related programs (e.g., educational technology or computer-assisted learning). In future surveys it would be desirable to ask students to identify their program of study or specialization.

If we combine the same frequency-of-use categories for women as we did for men (i.e., 2–5 times and 6 or more times), we see that the percentage of women using CD-ROM two or more times holds at approximately 45% up to age 34, drops to 10% in the 35-to-44 age group, and rises again to 34.6% in the 45+ age group. This lower use by females in the 35-to-44 age group may be attributed to a period in life occupied with child rearing and career advancement, when family and/or work commitments may allow little time for experimenting with new technology. Further investigation is needed to determine if lower use in this age group is typical for all women and if so, why. It is also interesting to note that 48% of the males in this age group have never used CD-ROM. Perhaps the same factors are at work for both men and women in this age group.

In the age category up to 24 years, it is difficult to draw conclusions concerning the effects of gender. Although the females are fairly evenly divided between never/once (55.3%) and two or more times (44.6%), there are too few males (four) to report trends.

Again, in students over 45, it is not possible to see trends for male users, as the group includes only six men. The women in this age group are concentrated in the never category of use (46.2%).

In summary, patterns of frequency of use differ for men and women in the 25-to-34 and 35-to-45 age groups. For men, an increase in use was noted in the 25-to-34 age group, with more or less consistent levels of use in the remaining age groups. For women, there was a noticeable decrease in the frequency of use in the 35-to-44 age group. These preliminary findings seem to indicate that patterns of use vary for males and females in different age groups, but further investigation is needed.

Table 5 shows that there is a statistically significant relationship between level of familiarity with computers and frequency of CD-ROM use in the total population, as evidenced by a significance level of .0171. However, a Somers' D value of .17321 indicates that the strength of the association is relatively weak. When familiarity with computers and frequency of use are analyzed controlling for gender, there is no statistically significant relationship (table 6). That is, when familiarity and frequency of use are tabulated separately for males and females, neither relationship is statistically significant at the .05 level. However, we analyzed the results to identify trends.

In table 6, the column totals show the distribution of females and males across

TABLE 5

CROSS-TABULATIONS FREQUENCY OF CD-ROM USE BY LEVEL OF FAMILIARITY WITH COMPUTERS

CD-ROM Use	Count / Column %	Aggregate Score: Score 9–13	Score 14–18	Score 19–24	Score 25–30	Score 31–36	Row Total
Never		21	28	25	22	10	106
		58.3%	56.0%	50.0%	40.7%	34.5%	48.4%
Once		6	3	7	5	1	22
		16.7%	6.0%	14.0%	9.3%	3.4%	10.0%
2–5 times		6	14	11	18	6	55
		16.7%	28.0%	22.0%	33.3%	20.7%	25.1%
6 or more times		3	5	7	9	12	36
		8.3%	10.0%	14.0%	16.7%	41.4%	16.4%
Column total		36	50	50	54	29	219
		16.4%	22.8%	22.8%	24.7%	13.2%	100.0%

Number of Missing Observations = 12 Chi-Square = 24.54212 df = 12 Significance = .0171 Somers' D = .17321

TABLE 6

CROSS-TABULATIONS FREQUENCY OF CD-ROM USE BY LEVEL OF FAMILIARITY WITH COMPUTERS CONTROLLING FOR GENDER

CD-ROM Use	Count Column %	Aggregate Score Score 9–13	Score 14–18	Score 19–24	Score 25–30	Score 31–36	Row Total
Never	Female	21	26	17	18	4	86
		63.6%	59.1%	47.2%	46.2%	36.4%	52.8%
	Male	0	2	8	4	6	20
		0.0%	33.3%	57.1%	26.7%	33.3%	35.7%
Once	Female	5	3	5	4	1	18
		15.2%	6.8%	13.9%	10.3%	9.1%	11.0%
	Male	1	0	2	1	0	4
		33.3%	0.0%	14.3%	6.7%	0.0%	7.1%
2–5 times	Female	5	11	9	13	3	41
		15.2%	25.0%	25.0%	33.3%	27.3%	25.2%
	Male	1	3	2	5	3	14
		33.3%	50.0%	14.3%	33.3%	16.7%	25.0%
6 or more times	Female	2	4	5	4	3	18
		6.1%	9.1%	13.9%	10.3%	27.3%	11.0%
	Male	1	1	2	5	9	18
		33.3%	16.7%	14.3%	33.3%	50.0%	32.1%
Column total	Female	33	44	36	39	11	163
		20.2%	27.0%	22.1%	23.9%	6.7%	100.0%
	Male	3	6	14	15	18	56
		5.4%	10.7%	25.0%	26.8%	32.1%	100.0%

Female: Chi-Square = 9.87957
Significance = .6265
Somers' D = .13947

Male: Chi-Square = 15.62582
Significance = .2090
Somers' D = .15838

NOTE: Column percentages are calculated separately for female and male respondents.

the scores. Women are fairly evenly distributed across the scores from 9 to 30, varying from a low of 20.2% to a high of 27.0%. At the highest score level, there are only 6.7% of the women. On the other hand, the percentage of men increases as the score levels increase. In fact, only 16.1% of the men have scores lower than 19. When we look at levels of frequency of use, the numbers of men are so low in score categories 9–13 and 14–18 that no trends can be seen. For men, their computer experience does not appear to be associated with their frequency of CD-ROM use except at the level of 6 or more times in the score categories of 19–24 and higher.

In the never category of use, the percentage of females decreases across the scores from a high of 63.6% in the 9–13 category to a low of 36.4% in the 31–36 score category. Conversely, at the level of use of 6 or more times, the percentage of women increases as the scores increase, with a slight decrease in percentage in the 25–30 score category. That is, the percentage ranges from a low of 6.1% in the lowest score category to a high of 27.3% in the highest score category. These trends indicate an association between frequency of CD-ROM use and familiarity with computers for women. This agrees in part with Matthews' study, which found a correlation between nonuse of online public access catalogs and less experience with computers.[15] We found a corresponding correlation in nonuse of ERIC CD-ROM for women.

The correlation between level of study and frequency of use was not found to be statistically significant at the .05 level (table 7). However, at the level of use of 6 or more times, there was a correlation in that there were 7.9% of the undergraduates and 21.1% of the graduates. When level of study and frequency of use are analyzed controlling for gender, neither relationship is statistically significant at the .05 level (table 8), but the trend found in the

TABLE 7

CROSS-TABULATIONS FREQUENCY OF CD-ROM USE BY LEVEL OF STUDY

CD-ROM Use	Count / Column %	Level of Study: Undergraduates	Graduates	Row Total
Never		48	66	114
		53.9%	46.5%	49.4%
Once		11	12	23
		12.4%	8.5%	10.0%
2–5 times		23	34	57
		25.8%	23.9%	24.7%
6 or more times		7	30	37
		7.9%	21.1%	16.0%
Column total		89	142	231
		38.5%	61.5%	100.0%

Number of Missing Observations = 0 Chi-Square = 7.54257 df = 3 Significance = .0565 Cramer's V = .18070

TABLE 8

CROSS-TABULATIONS FREQUENCY OF CD-ROM USE BY LEVEL OF STUDY CONTROLLING FOR GENDER

CD-ROM Use	Count / Column %	Level of Study: Undergraduates	Graduates	Row Total
Never	Female	45	49	94
		57.0%	51.6%	54.0%
	Male	3	17	20
		30.0%	36.2%	35.1%
Once	Female	9	10	19
		11.4%	10.5%	10.9%
	Male	2	2	4
		20.0%	4.3%	7.0%
2–5 times	Female	20	22	42
		25.3%	23.2%	24.1%
	Male	3	12	15
		30.0%	25.5%	26.3%
6 or more times	Female	5	14	19
		6.3%	14.7%	10.9%
	Male	2	16	18
		20.0%	34.0%	31.6%
Column total	Female	79	95	174
		45.4%	54.6%	100.0%
	Male	10	47	57
		17.5%	82.5%	100.0%

Female: Chi-Square = 3.13650 Male: Chi-Square = 3.57968
Significance = .3711 Significance = .3106
Cramer's V = .13426 Cramer's V = .25060

NOTE: Column percentages are calculated separately for female and male respondents.

total population is again apparent. That is, at the level of use of 6 or more times, the percentage of graduates is higher for both females and males (6.3% of the undergraduates and 14.7% of the graduates for females, and 20% of the undergraduates and 34.0% of the graduates for males). This trend was apparent for both males and females. This higher level of use on the part of graduate students is not unexpected, given that at this level of study more research is required.

In addition to the questions testing the hypotheses, several questions were asked for administrative purposes. In order to determine if further publicity was needed, we asked students when they first learned the library had acquired ERIC CD-ROM.

Although 43.5% of our respondents reported learning of ERIC CD-ROM between February and September 1987, there were still 24.3% who learned of it only through our questionnaire.

We asked students who had used ERIC CD-ROM if they planned to use it again in order to determine if this was an area requiring further study. Only 7% of the students who had tried ERIC CD-ROM reported that they would not use it again. Of those who had not used it, 82% planned to do so. It would appear that students are receptive to this new technology and, having tried it, are planning to use it again.

Respondents were asked if they would be interested in instruction classes, if available, and 76.9% replied affirmatively. Since the time of our survey, SilverPlatter has added a tutorial to the ERIC software that may partially meet this need. Further investigation will be required to ascertain its effectiveness.

SUMMARY AND CONCLUSIONS

The results of this study may enable libraries to concentrate limited resources and personnel in areas where the greatest need has been identified. Some of these areas are discussed below.

Since a correlation was found between frequency of use of ERIC CD-ROM and level of familiarity with computers for women, training sessions for people with little or no previous computer experience might include a very basic introduction to computers and the computer keyboard, as well as instruction in elementary searching techniques. Ideally, hands-on experience would be an invaluable part of these workshops.

Since the results of our study indicate that frequency of use is not significantly related to level of study, it may not be essential to hold separate workshops for undergraduate and graduate students. Results associated with age may indicate the advisability of holding workshops for mature students so that presentations can be geared to their needs. Furthermore, it may be advisable to publicize to mature students the advantages of learning to use CD-ROM, e.g., eventual time savings and the ability to combine concepts.

As noted earlier, many education students have had an extensive introduction to the library because they must complete as part of a course requirement a very detailed library experience which requires them to use education indexes. In fact, 78.8% use the library at least once a month, and only 4.3% never use the library. Therefore, increased general library instruction and increased library publicity would have minimal impact on this population.

A surprising finding was the fact that 24.3% of our respondents learned that the library had acquired ERIC CD-ROM through our survey, although it was extensively publicized when acquired. This finding may indicate the need for continuing and/or specialized publicity, perhaps through such channels as the registration process.

Of our respondents, almost half had never used ERIC CD-ROM. This can partially be accounted for by the fact that half of the nonusers were unaware of its existence prior to our survey. However, further investigation may determine other factors that may be influencing nonuse. For example, do students not have a need to use indexes within certain programs of study? Do some working students have access to library materials through their school board library?

Since ERIC is an index of educational resources, it seemed appropriate to limit our study to education students. Future studies might incorporate more academic disciplines and appropriate CD-ROM products. It would also be useful to compare the response of students in several universities. It is interesting to note that our population is 75% female and 25% male. When we look at level of study, the women are almost evenly divided between undergraduates (45.5%) and graduates (54.6%), while the men are primarily graduate students (82.5% graduates as compared with 17.5% undergraduates). This profile may be typical of most education departments, but further investigation would be necessary to verify this.

In conclusion, this preliminary research has identified some factors associated

with frequency of use of ERIC CD-ROM in education students at Concordia University. However, further studies are needed to determine whether these findings are valid for students in other universities and in other disciplines.

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