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Dual and Concurrent Enrollment and Transition to Postsecondary Education

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Abstract

Dual and concurrent enrollments enable students to earn postsecondary credits while still in high school. The 2006 Perkins legislation encourages such enrollments as a component of programs of study. There is evidence that students who earn dual enrollment credits have slightly (typically 4% to 5%) more positive outcomes in postsecondary education than similar students who do not. These effects, however, may be due to self-selection into dual credit courses. The modest advantages associated with dual enrollment may not be sufficient to justify the effort to develop and implement such programs.

The Carl D. Perkins Career and Technical Education Improvement Act of 2006 (P.L. 109-270) states that Programs of Study (POS) "may include the opportunity for secondary education students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits" (Sec 122 [c][1][A][iii]). This language encourages but does not require POS to include such opportunities. It reflects a growing interest in expanding dual enrollment beyond its traditional function of providing challenging educational experiences for high-achieving students. In 1974, the first middle college high school was established to provide a different environment for students who were often alienated from the typical high school (Lieberman, 2004). The middle college was located on a college campus and enabled students to earn college credits while in high school. In recent years, the Early College High School Initiative expanded the middle college concept by attempting to give students the opportunity to earn enough credits for an associate degree or the first two years of a baccalaureate degree while in high school (American Institutes for Research and SRI International, 2007).

Proponents of dual enrollments perceive them as a means of both increasing the efficiency of education by reducing the time and cost of obtaining postsecondary degrees and increasing the rigor of high school instruction, thereby, reducing the need for postsecondary remediation. Reindel's (2006) summary of a conference that addressed the broad issues of accelerated learning identified a tension between these two objectives. The efficiency benefits (reducing time and cost) are maximized if accelerated learning primarily serves students who do well in school. The rigor

benefits (reducing the need for remediation) are maximized if accelerated learning also serves those students who are at academic risk by increasing their options and motivation. Other major issues addressed at the conference concerned the rigor and quality of accelerated learning and financing. Reindel concluded that a consensus emerged that accelerated learning "holds considerable promise as a means of bridging gaps in a decentralized educational system" (p. 9), but much more evidence is needed to determine if this promise is being realized.

There is evidence of participation by career and technical education (CTE) students in dual enrollment courses. Waits, Setzer, and Lewis (2005) reported that during the 2002-2003 school year, 71% of public high schools offered courses in which students could simultaneously earn both high school and college credit. Almost all (92%) of these schools offered dual credit academic courses and approximately one-half (51%) offered dual credit CTE courses. While dual credit courses were widely available, students taking these courses represented only 8% of the total high school enrollment during the 2002-2003 school year.[1] Students taking CTE courses comprised 36% of all dual credit students or 3.1% of total high school enrollment. These are the most recent national data available, but the growing interest in dual enrollment, as reflected in the conference reported by Reindel (2006), suggested that current figures are probably higher.

This article focuses on whether acquiring postsecondary credits while in high school facilitates secondary to postsecondary transitions for CTE students. Only dual enrollment courses are addressed, not Advanced Placement (AP) or International Baccalaureate (IB) courses. The full IB curriculum and 35 of the 37 AP courses are academic and designed as college-level courses for high school students, not actual college courses. No studies were found that addressed participation of CTE students in such courses. Studies of dual enrollment/credits for CTE students, in general, were first examined, followed by the more structured approach of middle/early college high schools.

Dual Enrollment/Credits

Dual credit courses vary on several dimensions beyond their content. Students may take individual (cafeteria-style) courses or defined sequences, which may be taught by high school or college faculty. The courses may be offered in high schools or on college campuses, and may enroll only high school or both high school and

[1] This percentage was estimated by dividing the 1,200,000 students enrolled in dual credit courses reported by Waits et al. (2005) by the 14,067,000 enrollment in grades 9 through 12 in the fall of 2002 reported in Table 2 of the *Digest of Educational Statistics: 2007*, retrieved June 3, 2008 from http://nces.ed.gov/programs/digest/d07/tables/dt07_002.asp?referrer=list. The percentages of students taking dual credit courses may be slightly inflated because of duplicate counting of students taking more than one such course.

college students. The courses may be targeted to high-achieving or underserved students. Questions have been raised concerning the level of the courses: How qualified are the high school instructors who teach most of these courses as adjunct college faculty? Are the courses really at the postsecondary level or are they adjusted to accommodate high school students (Dougan, 2005)? With variability in delivery, it is difficult to estimate the effect of earning dual credits on secondary to postsecondary transition, but there have been attempts to do so. Only two studies were found that made explicit attempts to control for the self-selection inherent in enrolling in dual credit courses (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007; Kotamraju, 2005). The method and findings of these two studies are presented in some detail.

Karp et al. (2007) analyzed student records from Florida and the City University of New York (CUNY). The Florida records were for 299,685 students who should have graduated during the 2000-2001 and 2001-2002 school years. The records included data with respect to (a) courses taken in high school and college, (b) dual enrollment courses and grades, (c) final high school grade point average (GPA) and semester averages in college, and (d) demographic information including age, gender, race/ethnicity, English language proficiency, and citizenship. The researchers added information regarding high school and neighborhood characteristics from the U.S. Department of Education Common Core of Data and the 2000 Census. Career and technical education students were defined as those who took three or more courses that provided preparation for employment in a given occupational area. The data in New York were for 2,303 students who graduated from one of the city's 19 CTE high schools and enrolled in any of the CUNY community or four-year colleges in 2001 or 2002. The information on these students included dual enrollment courses and grades, high school grades, credits and grades earned for all CUNY courses attempted, and demographic, high school, and neighborhood characteristics. The manner in which the New York sample was defined excluded records for non-CTE students.

Kotamraju (2005) also analyzed state-level data to determine the relationship between participating in the Minnesota Postsecondary Enrollment Options program and GPA at the postsecondary level. This program allows all high school students who meet eligibility standards to take courses offered by any of the institutions in the Minnesota State College and University system. Kotamraju selected students who satisfied the following criteria: took dual enrollment courses during the 1999-2000 or 2000-2001 school years, graduated in the spring of 2001, and enrolled as full-time students in the same two-year colleges that had offered the courses in which they had taken their dual enrollment courses anytime between the fall of 2001 and the spring of 2004. All of these colleges were part of the Minnesota State Colleges and Universities system. When these students were identified, they were matched with similar students who had also graduated in 2001 and entered these two-year colleges during the same time period. The matching was based on gender, ethnicity, and high

school cumulative GPA. The final sample included 3,639 students, of whom 461 had taken dual enrollment courses. Those who had taken such courses were classified into those who had taken only liberal and general study courses (45%), those who had taken only CTE courses (13%), and those who had taken both (43%). The restrictive criteria used by Kotamraju to define the sample resulted in students with similar personal characteristics and high school achievement who had similar exposure to postsecondary education but entered with or without having experienced dual enrollment. The matching, of course, could not control for differences in motivation, career aspirations, or other unmeasured variables.

The Karp et al. (2007) analyses of the data from Florida yielded a number of advantages associated with earning dual credits while in high school. Logit regressions that controlled for student, high school, and neighborhood characteristics yielded the percent advantages for dual credit students on the outcomes shown in Table 1. The percentages and pseudo R^2 are derived from the tables in the Karp et al. report that are listed in the last column of Table 1. The logit probabilities are expressed as percent advantages. For the first outcome, obtaining a high school diploma, all students who had earned credits in at least one dual enrollment course were 4.3% more likely to graduate than students who had not earned such credits. For CTE students, this advantage was only 1.0%. Most of the other results for the full sample and CTE students were similar. That is, dual enrollment was associated with essentially the same benefits on these outcome measures for both CTE and non-CTE students. The pseudo R^2 is interpreted the same as the R^2 in ordinary least squares; they represent the percentage of variability in the outcome variables that can be explained by the variables in the logit model.

Ordinary least squares (using the same independent variables as the logit regressions) was used to estimate the effect of dual enrollment on the continuous variables GPA and total credits earned at the postsecondary level. These analyses yielded the net increases in the outcome variables associated with dual enrollment shown in Table 2. Again, the advantages associated with earning dual enrollment credit for CTE students were similar to those for all students.

In Tables 1 and 2, the postsecondary outcomes for the full sample were based on more than 127,000 students and the results for CTE students were based on more than 18,000. All students had enrolled in public colleges and universities in Florida. These large numbers reduce the error estimates in the regression models and, therefore, increase the chances of finding significant relationships in the data.

The CUNY data had far fewer student records (2,303) and all of these students had graduated from a CTE high school that was operated by the New York City school system. Additionally, the students had enrolled in one of the colleges of the CUNY system. As a result, it was not possible to test the effect of dual enrollment on high school graduation or postsecondary enrollment. The advantage of the CUNY data is that all of the dual enrollment courses were through College Now, a cooperative program of CUNY and the New York City public schools. College Now

has standardized eligibility and application procedures and monitors curriculum and instruction. This coordination across high schools reduces the variability in dual enrollment experiences, thereby, enhancing the fidelity of the intervention.

Table 1

Percent Advantage Associated with Participation in Dual Enrollment Courses in High School on Selected Outcome Variables, Full Sample and CTE Students, Logit Regressions

Outcome	Percent Advantage		Pseudo R^2		Table
	Full	CTE	Full	CTE	
Obtain high school diploma	4.3	1.0	.19	.20	5
Enroll in postsecondary education	16.3	18.1	.14	.14	6
Enroll in 4-year degree program	7.7	8.6	.27	.24	7
Enroll full-time in first term	4.5	4.9	.05	.04	8
Persist to second term in first year of enrollment	4.5	4.2	.07	.06	9
Persist to second year	5.4	5.2	.08	.07	12

Note. The results in this table are taken from the tables in the Karp et al. (2007) report that are listed in the last column. The modal number of observations for the first two outcomes is 217,466 for the full sample and 31,050 for the CTE students. The modal number of observations for the remaining four outcomes is 127,623 for the full sample and 18,573 for the CTE students. All differences between dual enrollment and non-dual enrollment students are significant at the .01 probability level. However, for those CTE students obtaining a high school diploma, the difference is significant at the .05 level.

Table 2

Net Independent Effect Associated with Participation in Dual Enrollment Courses in High School on Selected Outcome Variables, Full Sample and CTE Students, Ordinary Least Squares

Outcome	Net Effect		R^2		Table
	Full	CTE	Full	CTE	
First year GPA	.22	.26	.24	.18	10
Second year GPA	.21	.26	.27	.20	13
Cumulative GPA	.20	.24	.29	.22	14
Total credits	15.20	15.20	.29	.26	15

Note. The results in this table are taken from the tables in the Karp et al. (2007) report that are listed in the last column. The modal number of observations for all outcomes is 128,295 for the full sample and 18,601 for the CTE students. All differences between dual enrollment and non-dual enrollment students are significant at the .01 probability level.

Among CTE graduates who enrolled in one of the CUNY colleges, those who had taken College Now dual enrollment courses were 9.7% more likely than those without dual enrollment to pursue a bachelor's degree. The GPA of the dual enrollment students was 0.13 higher than that of the non-dual enrollment students during their first semester. Over the 3.5 years of postsecondary experience that was examined, the dual enrollment students earned 10.6 more credits than their non-dual enrollment counterparts. Several other outcome measures that were examined did not reach statistical significance at the .05 probability level, but the effects estimates were all in the expected directions. If the number of student records had been as large as in Florida, many of these may have attained the .05 level of significance.

During the three years of postsecondary experience that Kotamraju (2005) examined, students who had taken dual enrollment courses in high school had a cumulative mean GPA of 2.92 compared to 2.53 among those students who had no dual enrollment courses. Students who took any CTE courses at the postsecondary level were classified as participants, concentrators, and completers.[2] Only among participants was there a statistically significant difference in GPA between those who had taken dual enrollment courses, 2.55, and those who had not, 1.88. Kotamraju concluded that the dual enrollment courses appeared to give students a head start on succeeding in college courses, but that this effect declines as postsecondary exposure increases.

Most of the results from these two studies indicated modest advantages associated with dual enrollment. Using the best methods, short of random assignment of students, to assess impact, it appears that dual enrollment is associated with slightly better enrollment, persistence, GPA, and total credits in postsecondary education. Unfortunately, the statistical methods used in these analyses cannot control for the self-selection of students into dual enrollment courses. These courses were more demanding than typical high school courses and students choosing this extra work were, by definition, different from their classmates. The researchers who conducted these studies were fully aware of these problems, as reflected in the following caution:

> It is important to recognize that other unmeasured factors, such as student motivation or parental encouragement and support, are likely correlated with participation in dual enrollment and are also likely to generate a positive effect. By not controlling for important factors affecting a student's decision to participate in dual enrollment, it is possible that our models may generate what appear to be positive impacts when in fact there are no such impacts or there are negative impacts. (Karp et al., 2007, p. 20)

[2] The participants were students who had selected a CTE major or taken one CTE course. Concentrators had completed one-third of the credits required by their programs. Completers had received certificates, diplomas, or AA or AAS degrees.

Self-selection and admission practices are also inherent problems when attempting to estimate the effects of middle/early colleges.

Middle/Early College High School

Middle/early colleges are intensive dual enrollment programs targeted to students who are underserved and often deemed "at-risk" in a traditional high school. Many CTE students are also at risk, and the experiences of middle/early colleges provide some guidance as to what a major expansion of dual enrollment opportunities for CTE students is likely to yield. Is there a difference between a middle college and an early college? Middle college is by far the older term. The New York City Board of Education and LaGuardia Community College established the first middle college as a charter high school located on the college's campus in 1974 (Lieberman, 2004). This first school inspired many others, all of which have the goal of providing challenging educational experiences combined with a supportive environment. College-level courses are taught either by faculty of the college or high school teachers. In these courses, students both satisfy high school graduation requirements and earn college credit.

The original middle college served as a model for many others that were established across the country. In 2002, the concept provided the foundation for the Early College High School Initiative. This initiative is funded by several major foundations, including Bill & Melinda Gates, Ford, Carnegie Corporation, and W. K. Kellogg, and is coordinated and supported by Jobs for the Future. The use of *early* rather than *middle* to label this initiative appears to reflect an intention to indicate that it differs from its predecessors.

The literature about the two types indicates that early colleges differ from middle colleges primarily in where they are located and their expectations regarding credits to be earned. Early colleges may not be located on a college campus, but middle colleges must be. Accordingly, the first principle of the Middle College National Consortium[3] is that middle colleges must be on a college campus. Janet Lieberman, a professor at LaGuardia Community College, is credited with being the originator of the first middle college. In a paper she prepared for the Early College High School Initiative, she stated, "the early college high school design sees non-integrated space as a temporary accommodation, with the eventual hope of situating the high school on the college campus" (Lieberman, 2004, p. 3). The second difference is the extent of articulation between the high school and postsecondary curriculum, and the goal for students in early colleges to earn 60 postsecondary credits (an associate degree or two years of transferable credits to a four-year institution) by the time they graduate from high school. Middle colleges typically do

[3] See http://www.mcnc.us.

not have as articulated a curriculum or such specific credit goals. However, the emphases on providing challenging content in a supportive environment to underserved students are common to both.

When accessed on March 4, 2009, the Early College High School Initiative reported on its Web site[4] that its partners "have started or redesigned 200 schools in 24 states and the District of Columbia." The implementation of Early College High Schools is being evaluated by the American Institutes for Research (AIR) and SRI International. These organizations issued jointly three annual reports (AIR/SRI, 2005, 2006, 2007) that assessed how the various parties involved in implementation carried out their roles and the extent to which their performance reflected the initiative's core principles.

The implementation findings of the AIR/SRI reports are sobering for anyone concerned with improving education, especially for underserved populations. The Early College High Schools Initiative appears to have all the components necessary to have a significant impact on student performance. Many educators would endorse the approach that the initiative has adopted, especially the emphasis on the new *3 Rs*: rigor, relevance, and relationships. The initiative also provides high levels of support through intermediary organizations. These organizations are intermediary in that they represent the funding foundations to foster early college high schools within the geographic areas they serve. These intermediaries provide support far beyond anything a typical Local Education Agency (LEA) could provide.

Despite the soundness of the approach and the support provided, it is clear from the three evaluation reports that implementing the core principles of the initiative is difficult. Assisting students who are typically underrepresented in postsecondary education to do college-level work while in high school is a formidable task. There is a continuing debate among schools in the initiative about how selective they should be. Officials of some schools contend that it does little good to admit students unable to meet the demands of rigorous curriculum and, as a result, have established selection criteria. Others respond that such criteria are antithetical to the goals of early college. Few of the early colleges have been able to implement the second core principle of graduating students with an associate degree or 60 credits transferable to a four-year institution. They have modified this principle in various ways, including lowering the number of credits to be earned, giving high school credit for grades below B and college credit for B and above, and in at least one case, substituting the goal of preparing students to be college-ready for that of earning actual college credits (AIR/SRI, 2007, p. 17).

The 2007 AIR/SRI report and a few other studies have examined the academic performance and transition of middle/early college students. These typically show advantages over comparison groups (e.g., Lieberman, 1986; Resources for Learning,

[4] See http://www.earlycolleges.org.

2007); however, only one of these studies was found (Dynarski, Gleason, Rangarajan, & Wood, 1998) that used a matching or control group design. In the other studies, including the 2007 AIR/SRI report, middle/early college participants were compared to all other students in the schools or districts from which the participants were drawn. Without some attempt to control for the differences between students who choose to participate in early/middle colleges and those who do not, such comparisons have little meaning.

The Dynarski et al. (1998) study, in contrast, was a random assignment experiment that satisfied the What Works Clearinghouse (WWC) criteria for scientific rigor.[5] This study was part of a larger evaluation that examined the effectiveness of 16 middle school and high school dropout prevention programs. The middle college study included 394 students who applied to attend an alternative high school operated by the Seattle Public Schools in cooperation with Seattle Central Community College. At the time it was evaluated, the high school enrolled approximately 300 students and its core academic curriculum focused on two modules—mathematics/science and integrated humanities. The study participants were generally older students who were overage for grade (average was just under 18) or had previously dropped out of school. Because more students applied to the middle college than could be admitted, a lottery was used for admission. Students not admitted (i.e., those assigned to the control group) were free to participate in other regular and alternative education programs in the community and most did.

The original study sample of 516 students was comprised of two cohorts. Cohort 1, drawn from students who applied to the middle college at the beginning of the 1992-1993 school year, included 199 students who were admitted and 123 students in the control group. Cohort 2, drawn from those who applied for the 1993-1994 school year, consisted of 123 students who were admitted and 71 students in the control group. A follow-up survey was administered two years after random assignment; 244 intervention group students and 150 control group students responded yielding response rates of 76% and 77%, respectively. The results were reported for each cohort and for the cohorts combined.

Because this experiment was part of a larger dropout prevention evaluation, the outcome measures were limited to dropping out, graduating, or earning a GED. For Cohort 1, the only significant finding was that more control students earned a GED by the end of the third-year than middle college students (37% vs. 24%) resulting in an effect size computed by WWC of -.38. When the cohorts were combined, 36% of students in the middle college group had dropped out of school, compared with 33% of control group students. The researchers also found that 40% of students in the middle college group had earned a high school diploma or GED certificate two years after random assignment, compared with 38% of control group students. Neither difference was significant statistically or important substantively.

[5] For a description of these criteria, see What Works Clearinghouse (2008).

Even conceding that the Dynarski et al. study is from only one city and is over a decade old, its methodological rigor requires that its findings be considered carefully. There was no self-selection in this study. Random assignment ensured that any differences in ability and motivation among the participants were distributed randomly in the treatment and control groups. With this random assignment, the early college intervention did not show positive effects.

Conclusions and Discussion

The Karp et al. (2007) and Kotamraju (2005) studies found that there were positive effects associated with taking dual enrollment courses. Both studies compared students who took dual enrollment courses of any type to students who did not. These studies controlled for characteristics of the students, but not for the type or quality of the dual enrollment courses that they took. Even with a treatment that was highly variable, advantages were found for dual enrollment students. Most of these advantages were found using regression methods that yielded estimated differences of 4% or 5%, except for entry into postsecondary education, in which dual enrollment students were 16% more likely to enroll. This large difference implied that even before taking dual enrollment courses, those who took them were more inclined to continue their education beyond high school than students who did not.

When the degree of articulation moves beyond high school students taking selected college courses, implementation becomes more difficult. Articulation agreements ensure a more structured alignment between secondary and postsecondary instruction; however, they are more difficult to achieve than dual enrollment. The foundation of a Tech Prep consortium is an articulation agreement between high schools and one or more postsecondary institutions. Articulation requires that faculty in the same occupational areas from the two levels must come to agreement on the content to be taught at their respective levels and on the competencies that high school students must demonstrate to receive college credits. In most agreements, the credits that students earn in high school are not awarded until the student (a) enrolls in a postsecondary institution that signed the agreement and (b) makes specified progress in the same occupational area studied in high school.

The credits earned in high school provide Tech Prep participants a head start in college, but the evidence is equivocal on whether these credits lead to postsecondary degrees or other credentials. As cited in *Three Previous Initiatives Similar to Programs of Study*, Bragg et al. (2002) conducted a longitudinal study of students who had participated in eight "high-fidelity" Tech Prep consortia. These consortia, in the judgment of an expert panel, had all of the characteristics that good Tech Prep programs should have. Over one-half of the high school graduates from these consortia (54%) continued their educations at the lead postsecondary institution in their consortia. In six of the consortia, over 80% continued their educations at some postsecondary institution. Despite these high rates, only 1 in 10 students who

enrolled obtained an associate degree or other certificate three to four years after high school. Even in the best performing consortium, only 19% obtained a credential. Bragg et al. compared these results to a matched group of non-Tech Prep participants and found no significant differences in credential attainment between the groups.

The study of career pathways by Lekes et al. (2007), found that students who earned dual credits while in high school increased their chances of earning a certificate or degree. Just as Bragg et al. (2002) had studied highly regarded Tech Prep programs, these data were from a community college that had received a national award for the quality of its transition pathways. Lekes et al. (2007) used regression methods to control for measured differences between students who had followed high school pathways to the community college and students who had not. The percentages in the two groups that received degrees or certificates were 21.3% for those students who had followed pathways and 17.2% for those who had not. This difference is of similar size to most of those found by Karp et al. (2007) on other outcome measures.

Early college high schools achieve the highest degree of secondary-postsecondary articulation, but the heavy emphasis on college-level instruction in high school does not appear feasible for most POS. Many of the students in CTE courses are similar to the students recruited for early college high schools. Both often come from economically disadvantaged families and perform poorly in academic classes. The large difference between them is self-selection into early college high schools.

Students who enter early college high schools commit themselves to studying much harder than the average student. Even with this commitment, however, the formative evaluation of the Early College High School Initiative (AIR/SRI, 2007) indicated that the initiative has had to modify one of its core principles. This principle originally stated that each student will complete high school with an associate degree or the credits for the first two years of a baccalaureate degree. The principle now states that students will earn *up to* two years of college credit. This modification reflects the difficulty of bringing students who are performing poorly at the high school level to the point that they can master college-level content. Like students in early college high schools, many CTE students do not possess the academic skills of the average high school student. Often they elect or are guided to CTE for this very reason. But enrolling in CTE courses does not require an explicit commitment to study hard. Their interest in the occupational areas they enter may provide more motivation to learn than the typical academic class; however, it is unlikely to bring them to college-level performance.

Given these considerations, it is concluded that, at best, modest gains in academic achievement are realized by CTE students who take college courses while in high school. Since regression analyses cannot fully control for individual differences, the advantages that have been found may be due to unmeasured differences between those who do and do not participate in dual enrollment classes.

These modest achievement gains must be considered, however, in light of the advantage in postsecondary credits earned by those who took college courses while in high school. The Karp et al. (2007) analyses of the Florida data found, for both the full sample and CTE students, that those students who participated in dual enrollment earned 15.2 more postsecondary credits than nonparticipants, the equivalent of a full semester of postsecondary education. In the CUNY data, the advantage for dual enrollment participants was 10.6 credits. These differences support the arguments that dual enrollment reduces cost and increases the efficiency of the educational process.

Dual enrollment may improve efficiency, but the evidence indicates that it has a modest impact on the academic skills that represent a major barrier to postsecondary success for many CTE students. Rather than assuming that the opportunity to take college courses will serve a motivational and remedial function, a more direct approach to improve the academic skills of high school CTE students is preferred. Career and Technical Education students' interest in the occupations they study can be used to improve their academic skills through curriculum integration. If academic skills are increased, students who enroll at the postsecondary level will be less likely required to take the developmental courses that often prevent them from studying the occupational skills they seek to learn.

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