

The Effect of Testing on Achievement: Meta-Analyses and Research Summary, 1910–2010

Source List, Effect Sizes, and References for Quantitative Studies

This study summarizes the research literature on the effect of testing on student achievement, which comprises several hundred studies conducted from the early 20th century to the present day. Links to relevant publications include:

<https://www.tandfonline.com/doi/full/10.1080/15305058.2011.602920>

<https://journals.sagepub.com/doi/metrics/10.1177/0193841X19865628>

<https://nonpartisaneducation.org/Review/Resources/HongKong.htm>

<https://nonpartisaneducation.org/Review/Resources/Amsterdam.htm>

Only quantitative studies are listed below. Publications thus far are based on 177 studies and 640 effects. Mean effect sizes range from a moderate $d \approx 0.55$ to a fairly large $d \approx 0.88$ depending on the way effects are aggregated or effect sizes are adjusted for study artifacts. Testing with feedback produces the strongest positive effect on achievement. Adding stakes or testing with greater frequency also strongly and positively affects achievement. The evidence from a century's worth of quantitative studies shows the effect of testing on achievement to be moderately to strongly positive.

Some studies have been added to the table since the publications above. They are noted with an * in the leftmost column.

Smaller-scale studies tend to produce stronger effects than do large-scale studies. Those who judge the effect of testing on achievement exclusively from large-sample multivariate studies deprive themselves of the most focused, clear, and precise

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evidence. Some prominent researchers in economics and education, for example, have claimed that no studies of “test-based accountability” had been conducted before theirs in the early 2000s. But this list includes 24 studies completed before 2000 whose primary focus was to measure the effect of “test-based accountability.” A few dozen more pre-2000 studies also measured the effect of test-based accountability although such was not their primary focus. Include qualitative and program evaluation studies of test-based accountability, and the count of pre-2000 studies rises into the hundreds.

THE EFFECT OF TESTING ON ACHIEVEMENT, QUANTITATIVE STUDIES

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geographic context	Unit of analysis	Number of Effects	Mean Effect size**
Gates, A.I.	1917	retention	K-12	lower secondary	US	campus	student	32	0.65
Jones, E.H.	1923	retention	college	undergrad	US	campus	student	13	1.42
Shore, Miles Victor	1925	testing frequency	K-12	lower secondary	IA	campus	student	2	0.28
*Jersild, A.T.	1926	retention	college	undergrad	CO	campus	student	8	0.14
Panlasigui, Isidoro	1928	mastery testing	K-12	primary	US	city	student	1	0.20
*Hertzberg, O. E., Heilman, J. D. & Leuenberger, H.	1929	retention	college	undergrad	NY, CO	campus	student	2	0.42
Deputy, E. C.	1929	testing frequency	college	undergrad	IN	campus	student	2	0.82
*Maloney, E. L., & Ruch, G. M.	1929	testing frequency	K-12	lower secondary	CA	campus	student	6	1.30
*Thisted, M. N. & Remmers, H. H.	1931	retention	college	undergrad	IN	campus	student	8	0.22
Turney, A. H.	1931	testing frequency	college	undergrad	US	campus	student	1	4.52***

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Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*O. E. Hertzberg, J. D. Heilman, H. W. Leuenberger	1932	testing frequency	college	undergrad	CO	campus	student	3	0.42
Kulp, D. H.	1933	testing frequency	college	graduate	US	campus	student	1	1.05
Keys, N.	1934	testing frequency	college	undergrad	CA	campus	student	3	0.36
*Kirkpatrick	1934	testing frequency							0.31
*Gable	1936	testing frequency							-0.80
*Bess E. Johnson	1938	testing frequency	college	undergrad	NY	campus	student	2	0.35
Noll, V. H.	1939	retention	college	undergrad	RI	campus	student	1	-0.26
Ross, C.C., & Henry, L. K.	1939	testing frequency	college	undergrad	IA	campus	student	1	1.31
Sones, A. M., & Stroud, J. B.	1939	retention	K-12	lower secondary	IA	campus	student	1	-0.26
Spitzer, Herbert F.	1939	retention	K-12	intermediate	IA	city	student	6	0.85
Fitch, Mildred L., Drucker, A. J., & Norton, J. A., Jr.	1951	testing frequency	college	undergrad	IN	campus	student	1	0.74

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Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
Mudgett, A. G.	1956	testing frequency	college	undergrad	MN	campus	student	2	0.20
*Burns, P. C.	1960	retention	K-12	intermediate	KS	school	student	2	0.75
Standlee, L.S., & Popham, W. J.	1960	testing frequency	college	undergrad	IN	campus	student	2	0.46
Selakovich, D.	1962	testing frequency	college	undergrad	TX	campus	student	2	-0.10
Curo, D.M.	1963	testing frequency	K-12	upper secondary	IN	metro area	student	1	0.31
Laidlaw, W. J.	1963	testing frequency	college	undergrad	NJ	campus	student	2	-1.11
*Mach	1963	testing frequency	college	undergrad	CA	campus	student	1	0.15
Denny, T., Paterson, J., & Feldhusen, J.	1964	testing frequency	college	undergrad	IN	campus	student	1	0.11
Sax, Gilbert, & Reade, Marybell	1964	practice test	college	undergrad	HA	campus	student	1	1.11
Stodola, Q.C., Eustice, D.E., & Kolstoe, R.H.	1964	testing frequency	college	undergrad	ND	campus	student	2	0.44
*English, R. A.	1965	retention	college	undergrad	AZ	campus	student	12	0.28

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Pikunas & Mazzota	1965	testing frequency	K-12	upper secondary	MI	city	student	1	1.03
Rothkopf, Ernst Z.	1966	practice test	college	undergrad	NJ	campus	student	4	2.29
*Westbrook, B. W.	1967	retention	K-12	upper secondary	FL	school	student	4	0.67
*Bruning, R.H.	1968	retention	college	undergrad	NE	campus	student	3	1.80
*Lachman, R. & Laughery, K. R.	1968	practice test	college	undergrad	NY	campus	student	8	0.80
*Wiggins, J. A.	1968	testing frequency	college	undergrad	NC	campus	student	1	1.30
*Olsen, Weber, & Dorner	1968	testing frequency							0.14
*Nystrom, N.K.	1969	testing frequency	college	community college	AZ	campus	student	1	0.52
*Sassenrath, J.M. & Yonge, G.D.	1969	retention	college	undergrad	CA	campus	student	2	0.33
*Frase, L. T., Patrick, E. & Schumer, H.	1970	accountability	college	undergrad	MA	campus	student	2	0.22

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Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Pratt	1970	testing frequency							0.19
*Katherine Marie Janczarek	1970	testing frequency	college	undergrad	MI	campus	student	2	0.61
Marso, R. N.	1970	mastery testing	college	undergrad	NE	campus	student	6	0.50
*Mawhinney, V. T., Bostow, D. E., Laws, D. R., Blumenfeld, G. J. & Hopkins, B. L.	1971	testing frequency	college	undergrad, grad	IL	campus	student	2	0.30
*Mary Collamer Hubbard	1971	testing frequency	college	undergrad	MI	campus	student	4	0.78
*Rose Marie Hesse	1971	testing frequency	college	undergrad	MI	campus	student	4	0.89
*Dustin	1971	testing frequency							0.62
Donaldson, Wayne	1971	retention	college	undergrad	PA	campus	student	3	0.56
Hogan, Robert M. & Kintsch, Walter	1971	retention	college	undergrad	CO	campus	student	4	0.05
Lawler, R.M	1971	mastery testing	college	undergrad	FL	campus	student	2	1.37

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Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
Monk, J. J., & Stallings, W. M.	1971	testing frequency	college	undergrad	IL	campus	student	9	0.20
*Anderson, R. C., Kulhavy, R. W. & Andre, T.	1972	retention	college	undergrad	IL	campus	student	3	0.46
*Kulhavy, R. W. & Anderson, R. C.	1972	retention	college	undergrad	IL	campus	student	3	0.62
*Owen T. Anderson, Robert A. Artman	1972	testing frequency	college	undergrad	PA	campus	student	1	1.00
*Gary R. McKenzie	1972	mastery testing	K-12	lower secondary	CA	city	student	4	0.31
Block, J. H.	1972	mastery testing	K-12	lower secondary	OR	city	student	2	0.04
Okey, J.R., Brown, J.L., & Fiel, R.L.	1972	testing frequency	college	undergrad	CA	campus	student	3	1.34
Weber, L., & Olsen, R. E.	1972	retention	college	graduate	IL	campus	student	4	0.20
Robinson, P.	1972	accountability	college	undergrad	UT	campus	student	2	0.22
*Boyd, W. M.	1973	retention	college	undergrad	MA	campus	student	3	0.58

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Bostow, D.E. & O'Connor, R.J.	1973	mastery testing	college	undergrad	FL	campus	student	1	1.01
Shapiro, S. L.	1973	testing frequency	college	community college	NY	city	student	1	0.43
Sheldon, M.S., & Miller, E.D.	1973	mastery testing	college	community college	CA	campus	student	1	0.61
Wentling, T.L.	1973	mastery testing	K-12	upper secondary	IL	city	student	4	0.22
Calhoun, James F.	1973	mastery testing	college	undergrad	NY	campus	student	2	0.83
*Tulving, E. & Watkins, M. J.	1974	retention	adult	all	CT	all	adult	1	0.99
*Rievman, S.P.	1974	testing frequency	college	undergrad	FL	campus	student	30	0.41
*Palmer	1974	testing frequency							0.55
*Williams & Lawrence	1974	testing frequency							0.34

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Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*James H. Block & Michael L. Tierney	1974	mastery testing	college	undergrad	CA	campus	student	1	-0.12
Martin, R.R, & Srikameswarant, Kam	1974	testing frequency & mastery testing	college	undergrad	Ontario	campus	student	4	0.27
Nation, J.R., Knight, J.M., Lamberth, J. & Dyck, D.G.	1974	mastery testing	college	undergrad	OK	campus	student	14	0.62
Okey, J.R.	1974	mastery testing	K-12	primary	IN	all	student	5	0.55
Semb, George	1974	mastery testing	college	undergrad	KS	campus	student	1	0.76
Hill, Mildred, et al.	1974	account-ability	K-12	primary	VT	school district	student	1	0.28
Reith, H., et al.	1974	testing frequency	K-12	intermediate	KS	suburban	student	3	0.47
Honeycutt, J.K.	1974	mastery testing	college	undergrad	OH	campus	student	1	1.61
Muha, Joseph F.	1974	mastery testing	college	community college	CA	campus	student	1	1.95
*Surber, J. & Anderson, R.	1975	retention	K-12	upper secondary	IL	school	student	2	0.53

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Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Jack R. Nation & Stephen S. Roop	1975	mastery testing	college	undergrad	TX	campus	student	2	0.13
*Townsend & Wheatley	1975	frequent testing							0.54
Anderson, Richard C. & Biddle, W. Barry	1975	retention	K-12	adults	IL	rural	student	2	0.52
Fiel, R.L., & Okey, J.R.	1975	mastery testing	K-12	lower secondary	IN	city	student	2	0.66
Goldwater, B.C. & Acker, L.E.	1975	mastery testing	college	undergrad	Canada	campus	student	1	0.77
Jones, F.G.	1975	mastery testing	K-12	lower secondary	GA	metro area	student	1	0.57
Knight, J.M., Williams, J.D., & Jardon, M.L.	1975	mastery testing	college	undergrad	TX	campus	student	4	0.60
Modigliani, Vito	1975	retention	K-12	lower secondary	CT	city	student	4	1.80
Anderson, Lorin W.	1975	mastery testing	K-12	lower secondary	SC	metro area	student	1	2.06
Decker, D.F.	1976	mastery testing	college	undergrad	RI	campus	student	4	2.28
Fehlen, J.E.	1976	mastery testing	college	undergrad	MN	campus	student	1	0.39

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Gaynor, Jessica & Millham, Jim	1976	testing frequency	college	undergrad	TX	campus	student	3	0.36
Gay, Lorraine R., & Gallagher, Paul D.	1976	retention	college	graduate	FL	campus	student	2	0.94
*Whitten II, W. B. & Bjork, R. A.	1977	retention	college	undergrad, grad	MI	campus	student	1	0.49
Hymel, G.M. & Gaines, W.G.	1977	mastery testing	K-12	upper secondary	LA	city	student	1	1.84
Kulik, J.A., Kulik, C. C., & Hertzler, E.C.	1977	mastery testing	college	undergrad	MI	campus	student	1	0.62
Nation, J.R., Massad, P., & Wilkerson, D.	1977	mastery testing	college	undergrad	TX	campus	student	1	0.86
*Sturges, P. T.	1978	retention	college	graduate	CA	campus	student	8	0.45
*Gall, M. D., Ward, B. A., Berliner, D. C., Cahen, L. S., Winne, P. H., Elashoff, J. D. & Stanton, G. C.	1978	retention	K-12	lower secondary	US west	school	student	22	~ +0.30
Landauer, T.K. & Bjork, R.A.	1978	retention	college	undergrad	IL	campus	student	1	0.75

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Badia, Harsh, & Stutts	1978	testing frequency	college	undergrad	OH	campus	student	1	0.40
Caldwell, E.C., et al.	1978	mastery testing	college	undergrad	WV	campus	student	1	1.60
Strasler, G.M.	1978	mastery testing	K-12	lower secondary	SC	metro area	student	2	1.66
Wellisch, J., et al.	1978	accountability	K-12	intermediate	CA	city	school	2	1.17
Burrows, Charles K. & Okey, James R.	1979	mastery testing	K-12	intermediate	IN	city	student	3	2.24***
Guskey, T.R. & Monsaas, J.A.	1979	mastery testing	college	community college	IL	campus	student	9	0.16
Down, A. Graham	1979	accountability	K-12	upper secondary	CO	city	student	1	1.45
Down, A. Graham	1979	accountability	K-12	upper secondary	NC	school district	student	1	1.22
*Wilkins	1979	testing frequency							0.30

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*Whiteley, J. W.	1980	retention	K-12	lower secondary	CA	school	student	6	-0.08
*Balota, D. A. & Neely, J. H.	1980	retention	college	undergrad	SC	campus	student	8	-0.06
*Hal R. Arkes	1980	retention, feedback	college	undergrad	US	campus	student	2	0.28
Benson, J.S. & Yeany, R.H.	1980	mastery testing	college	undergrad	GA	campus	student	4	1.05
Chiappetta, E.L. & McBride, J.W.	1980	mastery testing	K-12	lower secondary	TX	campus	student	2	0.61
Yeany, R.H., Dost, R.J., & Matthews, R.W.	1980	mastery testing	college	undergrad	GA	campus	student	1	0.76
Parramore, Barbara M., et al.	1980	accountability	K-12	upper secondary	NC	all	student	2	0.83
*Frank E. Fulkerson & Glen Martin	1981	testing frequency	college	undergrad	IL	campus	student	2	0.34
*Negin	1981	testing frequency							0.70

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Duchastel, P.C.	1981	retention	K-12	lower secondary	UK	campus	student	15	0.05
Leppmann, P.K., & Herrmann, T.F.	1981	testing frequency	college	undergrad	Canada	campus	student	3	0.94
Lueckemeyer, C.L.& Chiappetta, E. L.	1981	mastery testing	K-12	upper secondary	TX	suburban	student	1	0.56
Saunders-Harris, R, & Yeany, R.H.	1981	mastery testing	K-12	lower secondary	GA	metro area	student	6	0.51
*Elis, J. A., Konoske, P. J., Wallace II, W. H. &	1982	retention	college	undergrad	CA	campus	student	2	0.69
Nungester, Ronald J. & Duchastel, Philippe C.	1982	retention	K-12	upper secondary	PA	suburban	student	4	0.64
Bryant, N. Dale; Fayne, Harriet R.: & Gettinger, Maribeth	1982	mastery testing	K-12	intermediate	NY, IN	city	student	1	1.82
Mayer, V.J., & Rojas, C.A.	1982	testing frequency	K-12	lower secondary	OH	suburban	student	1	0.13
Brunton, Max L.	1982	accountability	K-12	upper secondary	OR	school district	student	1	0.81

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Arlin, M. & Webster, J.	1983	mastery testing	K-12	lower secondary	Canada	city	student	1	0.82
Clark, C.R.; Guskey, T.R.; & Benninga, J.S.	1983	mastery testing	college	undergrad	KY	campus	student	1	0.89
Dillashaw, F.G. & Okey, J.R.	1983	mastery testing	K-12	secondary	SC	rural	student	6	0.88
Runquist, Willard N.	1983	retention	college	undergrad	Canada	campus	student	5	2.96***
*Lindenberg, T. S.	1984	testing frequency	college	undergrad	IL	campus	student	22	0.30
*Eric F. Ward	1984	mastery testing	college	undergrad	IL	campus	student	2	0.47
Fuchs, Lynn S.; Deno, Stanley L.; & Mirkin, Phyllis K.	1984	testing frequency	K-12	intermediate	NY	city	teacher	3	0.77
Dunkelberger, G.E., Henry Heikkinen	1984	mastery testing	K-12	lower secondary	DE	suburban	student	1	0.20

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Guskey, T.R., Benninga, J.S., & Clark, C.R.	1984	mastery testing	college	undergrad	n/a	campus	student	1	0.78
Slavin, R.E. & Karweit, N.L.	1984	mastery testing	K-12	lower secondary	PA	city	student	1	0.09
Ketchie, Gary Joseph	1984	accountability	K-12	upper secondary	LA, FL	all	school	2	3.71***
Marsh, Robert	1984	retention	college	undergrad	NC	campus	student	1	0.60
Walstad, William B	1984	practice test	K-12	lower secondary	MO	all	district	1	0.27
LeMahieu, Paul G.	1984	mastery testing	K-12	primary	PA	city	student	6	0.19
Blackburn, K,T, & Nelson, D	1985	mastery testing	college	undergrad	GA	campus	student	1	1.69
McDaris, M. A.	1985	testing frequency & mastery testing	college	undergrad	OK	campus	student	1	5.77***
Hyde, R. M., et al.	1985	accountability	college	graduate	OK	campus	student	1	1.32

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Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
Fuchs, Lynn S., & Fuchs, Douglas	1986	mastery testing	K-12	primary	MN	rural	student	2	0.32
Mangino, E.; Battaile, R.; Washington, W.; & Rumbaut, M.	1986	accountability	K-12	upper secondary	TX	metro area	student	2	0.44
Rohm, R.A.; Sparzo, F.J.; & Bennett, C.M.	1986	retention	college	undergrad	IN	campus	student	3	1.97
*Stephens	1986	frequent testing							0.67
*Pressley, M., Snyder, B. L., Levin, J. R., Murray, H. G. & Ghatala, E. S.	1987	practice testing	college	undergrad	US	campus	student	7	0.49
*Hembree, R.	1987	accountability	K-12	intermediate	US	school	student	8	0.81
*Bush, B. R.	1987	practice testing	K-12	primary	NE	school	student	6	0.07
*Douglas J. Herrman, Herman Buschke, Melanie B. Gall	1987	testing frequency	college	undergrad	NY	campus	student	3	1.27
*Herbert Friedman	1987	testing frequency	college	undergrad	US	campus	student	1	0.74

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Koffler, Stephen L.	1987	accountability	K-12	lower secondary	NJ	all	student	3	0.47
Winfield, Linda F.	1987	accountability	K-12	lower secondary	US	all	student	6	0.28
*Slamecka, N. J. & Katsaiti, L. T.	1988	retention	college	undergrad	Canada	campus	student	6	0.77
*Yamin, S.B.	1989	testing frequency	college	undergrad	Malaysia	campus	student	1	1.33
*Cathy A. Grover, Angela H. Becker, & Stephen F. Davis	1989	testing frequency	college	undergrad	KS	campus	student	1	0.42
Beaulieu, R. P., & Frost, B. F.	1989	testing frequency	college	undergrad	MI	campus	student	2	0.60
Dineen, P, Taylor, J. & Stephens, Larry.	1989	testing frequency	K-12	upper secondary	NE	suburban	student	4	0.61
Glover, John A.	1989	retention	college	undergrad	IN	campus	student	7	1.94
Strawitz, Barbara M.	1989	testing frequency	college	undergrad	LA	campus	student	1	0.26

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Haynie, W.J. III	1990	retention	K-12	lower secondary	NC	all	student	6	0.66
Cone, Al L.	1990	testing frequency & mastery testing	college	undergrad	ND	campus	student	1	0.56
Johnson, P.E.	1990	testing frequency & mastery testing	college	undergrad	NC	campus	student	1	0.99
Schloss, P. J., Smith, M. A., & Posluzsny, M.	1990	mastery testing	college	graduate	NY	campus	student	2	1.06
McTarnaghan, Roy E.	1990	accountability	college	undergrad	FL	all	student	6	0.93
*Lundeberg, M. A. & Fox, P. W.	1991	accountability	college	undergrad	MN, WI	campus	student	20	0.64
*John R. Bergan, Ingrid E. Sladeczek, Richard D. Schwarz, Allen N. Smith	1991	feedback	K-12	kindergarten	AZ, CA, NM, IA, LA, MS	all	student	3	0.20
Clariana, R.B., Ross, S.M., & Morrison, G.R.	1991	mastery testing	K-12	upper secondary	TN	city	student	2	1.06
Haynie, W.J. III	1991	retention	college	undergrad	NC	campus	student	9	0.92

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Rodgers, Natalie; and Others	1991	accountability	K-12	upper secondary	TX	metro area	student	2	0.11
Morris, Don R.	1991	accountability	K-12	all	FL	city	student	1	1.60
*King, A.	1992	retention	college	undergrad	CA	campus	student	3	0.78
Kika, Frank M.; McLaughlin, T.F.; and Dixon, J.	1992	testing frequency	K-12	upper secondary	British Columbia	rural	student	4	0.40
Carrier, Mark, & Pashler, Harold	1992	retention	college	undergrad	CA	campus	student	4	0.72
Jacobson, J.E.	1992	accountability	K-12	upper secondary	US	all	student	6	0.65
Potter, David C., & Wall, Mary Ellen	1992	accountability	K-12	primary	SC	all	student	36	0.25
Wheeler, Mark A., & Roediger, Henry L., III	1992	testing frequency	college	undergrad	TX	campus	student	2	1.45
Brown, Steven M. & Walberg, Herbert J.	1993	accountability	K-12	primary	IL	city	student	5	0.38

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
Chao-Qun, Wei & Hui, Zhang	1993	accountability	K-12	all	China	city	student	1	1.07
*Annette M. Iverson, Grant L. Iverson, Leslie E. Lukin	1994	testing frequency	college	undergrad	IA, MO, OK	campus	student	4	0.21
*Haynie, W.J. III	1994	retention, testing frequency	college	undergrad	NC	campus	student	6	0.83
Ritchie, Donn & Thorkildsen, Ron	1994	accountability	K-12	intermediate	n/a	city	student	1	1.35
Fredericksen, N.	1994	accountability	K-12	primary	US	all	student	6	0.11
*Wolf, L. F. & Smith, J. K.	1995	accountability	college	undergrad	NY	campus	student	2	0.86
*Bangert, A. W.	1995	feedback	college	undergrad	SD	campus	student	2	0.33
Haynie, W.J. III	1995	retention	college	undergrad	NC	campus	student	2	1.10
*Lynne S. Robins & 5 others	1995	testing frequency	college	graduate	MI	campus	student	2	0.85

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Kuo, T. M. & Hirshman, E.	1996	testing frequency	college	undergrad	NC	campus	student	6	0.65
*Slater, T. F., Ryan, J. M. & Samson, S. L.	1997	effect of test type	college	undergrad	SC	campus	student	2	-0.09
Haynie, W.J. III	1997	retention	college	undergrad	NC	campus	student	2	1.17
*Balch, W. R.	1998	feedback	college	undergrad	PA	campus	student	3	0.37
*Demorest, S.M.	1998	testing frequency	K-12	upper secondary	WA	campus	student	2	0.14
Strauss, R.P., Bowes, L.L., Marks, M.S., & Plesko, M.R.	1998	accountability	K-12	lower secondary	PA	all	district	18	0.17
Grissmer, David & Flanagan, Ann	1998	accountability	K-12	lower secondary	US	all	student	3	0.20
Deck, D. W. Jr.	1998	testing frequency	college	undergrad	WV	campus	student	2	0.34
*Shebilske, W. L., Goettl, B. P., Corrington, K. & Day, E. A.	1999	testing frequency	K-12	upper secondary	TX	campus	student	5	0.68

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Fuchs, L. S., Fuchs, D., Karns, K., Hamlet, C. L. & Katzaroff, M.	1999	testing frequency	K-12	primary, intermediate	TN	campus	student	9	0.94
*Herrick, M. L.	1999	testing frequency	K-12	primary	MD	campus	student	4	0.63
*Leith Sly	1999	practice testing	college	undergrad	Australia	campus	student	2	0.30
*Robert B. Graham	1999	testing frequency	college	undergrad	NC	campus	student	1	0.38
Bishop, John H.	1999	accountability	K-12	upper secondary	Canada	all	school	2	0.66
*T. Buchanan	2000	retention, feedback	college	undergrad	NE	campus	student	1	0.49
DeMars, C.E.	2000	accountability	K-12	upper secondary	MI	all	student	7	0.74
Klass, G., & Crothers, L.	2000	mastery testing	college	undergrad	IL	campus	student	1	1.07
Bishop, John H.	2000	accountability	K-12	upper secondary	US	all	state	6	1.76

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
Massachusetts Finance Office	2000	accountability	K-12	primary	MA	all	student	1	0.24
Toenjes, L..A., Dworkin, A.G., Lorence, J., & Hill, A.N.	2000	accountability	K-12	upper secondary	TX	all	student	10	0.38
Wenglinsky, Harold	2000	testing frequency	K-12	lower secondary	US	all	student	2	3.19***
Woessmann, Ludger	2000	accountability	K-12	secondary	international	all	student	2	0.15
*Baumert, J. & Demmrich, A.	2001	accountability	K-12	upper secondary	Germany	city	student	5	TBA
Guza, D. S., & McLaughlin, T. F.	2001	testing frequency	K-12	intermediate	British Columbia	campus	student	2	0.65
Phelps, Richard	2001	accountability	K-12	lower secondary	international	all	nation	1	3.19***
Rosenblatt, Zehava, & Offer, Shimoni	2001	accountability	K-12	lower secondary	Israel	campus	student	16	0.34
Jacob, Brian A	2001	accountability	K-12	secondary	US	all	student	2	0.02
Bishop, J.H., Mane, F., Bishop, M., & Moriarty, J.	2001	accountability	K-12	intermediate , secondary	US	all	student	12	0.50

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Leeming, F.C.	2002	testing frequency	college	undergrad	TN	campus	student	3	0.46
Haynie, W.J. III	2002	retention	college	undergrad	NC	campus	student	9	1.15
Haynie, W.J. III	2002	retention	college	undergrad	NC	campus	student	4	0.29
Tighe, Erin, Wang, Aubrey, & Foley, Ellen	2002	accountability	K-12	all	PA	city	school	1	1.47
Carnoy, Martin; Loeb, Susanna	2002	accountability	K-12	intermediate	US	all	student	6	0.78
Amrein & Berliner	2002	accountability	K-12	intermediate, lower secondary	US	all	student	5	0.09
*Orlich, D.C.	2003	accountability	K-12	intermediate	WA	state	students	6	0.23
*Henly, D. C.	2003	testing frequency	college	graduate	Australia	campus	student	3	0.20
*Roberta E. Dihoff, Gary M. Brosvic, Michael L. Epstein	2003	retention	college	undergrad	NJ	campus	student	6	1.38

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
Haynie, W.J. III	2003	retention	college	undergrad	NC	campus	student	6	0.86
McDonald, Betty & Boud, David	2003	mastery testing	K-12	upper secondary	Barbados	all	student	4	0.50
Standards Work, Inc.	2003	accountability	K-12	all	VA	all	student	14	0.19
Baek, Sun-Geun, & Kim, Kyoung Jin	2003	mastery testing	early childhood	early childhood	Korea	campus	student	2	1.27
Meisels, et al.	2003	accountability	K-12	primary	PA	city	student	4	0.74
Noble, Julie	2003	practice test	K-12	secondary	US	all	student	2	0.10
Braun, Henry	2003	accountability	K-12	intermediate	US	all	student	4	0.22
Amrein-Beardsley & Berliner	2003	accountability	K-12	intermediate	US	all	student	3	0.61
Raymond, M.E., & Hanushek, E.A.	2003	accountability	K-12	intermediate	US	all	student	4	0.95
Rosenshine, B.	2003	accountability	K-12	intermediate , lower secondary	US	all	student	3	0.66

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Dylan Wiliam, Clare Lee, Christine Harrison, Paul Black	2004	program effect	K-12	intermediate	UK	all	student	1	0.31
*Marnie Thompson, Pamela Paek, Laura Goe, Eva Ponte	2004	program effect	K-12	primary, secondary	CA	all	teacher	1	0.25
Bishop, John H.	2004	accountability	K-12	secondary	international	all	nation	1	0.24
Hanushek, E.A. & Raymond, M.E.	2004	accountability	K-12	intermediate, lower secondary	US	all	student	3	0.31
*Marchant, G. J. & Paulson, S. E.	2005	feedback	college	undergrad	PA	campus	student	3	0.57
*Steven R. Wininger	2005	feedback	college	undergrad	KY	campus	student	1	0.86
Audette, Bernard P.	2005	accountability	K-12	upper secondary	MA	school district	student	2	1.42
Baek, Sun-Geun, & Hwang, Eun-Hui	2005	testing frequency	K-12	lower secondary	Korea	campus	student	1	1.13
Roediger, Henry L., III, & Marsh, Elizabeth J.	2005	retention	college	undergrad	MO	campus	student	1	2.73***

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
Williams, Natasha J., & Noble, Julie P.	2005	practice test	K-12	upper secondary	US	all	school	3	1.83
*Roediger III, H. & Karpicke, J. D.	2006	retention, testing frequency	college	undergrad	WA	campus	student	8	0.20
*Karpicke, J. D. & Roediger III, H. L.	2006	testing frequency	college	undergrad	MO	campus	student	3	0.54
*Jason C. K. Chan, Kathleen B. McDermott, Henry L. Roediger	2006	retention	college	undergrad	MO	campus	student	10	0.96
Chan, J.C.K., McDermott, K.B., & Roediger, H.L. III	2006	retention	college	undergrad	MO	campus	student	4	1.66
Grodsky, Warren, & Kalogrides	2006	accountability	K-12	lower secondary	US	all	student	4	0.06
Roediger, H.L., III, & Karpicke, J.D.	2006	retention	college	undergrad	MO	campus	student	2	0.92
Struyven, K., Dochy, F., Janssens, S., Schelfhout, W., & Gielen, S.	2006	testing frequency	college	undergrad	Belgium	campus	student	3	1.27
Nichols, S.L., Glass, G.V., & Berliner, D.C.	2006	accountability	K-12	intermediate	US	all	student	18	0.21

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
Alvarez, J.; Moreno, V.G.; & Patrinos, H.A.	2007	accountability	K-12	upper secondary	Mexico	all	student	6	0.33
*Karl K. Szpunar, Kathleen B. McDermott, Henry L. Roediger	2007	testing frequency	college	undergrad	MO	campus	student	3	1.64
*Andrew C. Butler, Jeffrey D. Karpicke, Henry L. Roediger	2007	feedback	college	undergrad	MO	campus	student	4	1.72
*Andrew C. Butler, Henry L. Roediger	2007	testing frequency	college	undergrad	MO	campus	student	2	1.92
Karpicke, Jeffrey D., & Roediger, Henry L. III	2007	retention	college	undergrad	MO	campus	student	2	0.80
*Carpenter, S. K., Pashler, H., Wixted, J. T. & Vul, E.	2008	retention	all	all	all	online panel (e.g., Mechanical Turk)	all	21	0.35
*Jeffrey D. Karpicke, Henry L. Roediger	2008	retention	college	undergrad	MO	campus	student	1	TBA
*Pooja K. Agarwal, Jeffrey D. Karpicke, Sean H. K. Kang, Henry L. Roediger	2008	retention, feedback	college	undergrad	MO	campus	student	8	1.62
*Andrew C. Butler, Jeffrey D. Karpicke, Henry L. Roediger	2008	retention, feedback	college	undergrad	MO	campus	student	4	TBA
*Andrew C. Butler, Henry L. Roediger	2008	retention, feedback	college	undergrad	MO	campus	student	1	1.52

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
ACT	2008	practice test	K-12	upper secondary	AR, OK, WV	all	student	1	0.09
*Toppino, T. C. & Cohen, M. S.	2009	testing frequency	college	undergrad	PA	campus	student	2	0.93
*Johnson, B. C. & Kiviniemi, M. T.	2009	testing frequency	college	undergrad	NE	campus	student	3	0.60
*Agarwal, P. K., Roediger, H. L., McDaniel, M. A. & McDermott, K. B.	2009	retention	K-12	lower secondary	IL	metro	student	4	0.36
*Douglas P. Larsen, Andrew C. Butler, Henry L. Roediger	2009	frequency of testing	college	graduate	MO	campus	student	2	0.85
*Simon D. Angus & Judith Watson	2009	frequency of testing	college	undergrad	Australia	campus	student	2	0.43
Marsh, E.J., Agarwal, R.K., & Roediger, H.L. III	2009	retention	college	undergrad	NC	all	student	3	2.13***
*Ghazala Azmat, Nagore Iriberry	2009	feedback	K-12	upper secondary	Spain	all	student	1	0.05
Marsh, E.J., Agarwal, R.K., & Roediger, H.L. III	2009	retention	K-12	upper secondary	IL	all	student		3.87***

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Drouin, M. A.	2010	feedback	college	undergrad	IN	campus	student	2	0.40
*Agarwal, P. K., Roediger, H. L., McDaniel, M. A. & McDermott, K. B.	2010	retention	K-12	lower secondary	IL	metro	student	5	0.24
*Jeffrey D. Karpicke, Henry L. Roediger	2010	retention	college	undergrad	MO	campus	student	6	TBA
*Lisa K. Fazio, Pooja K. Agarwal, Elizabeth J. Marsh, Henry L. Roediger	2010	retention	college	undergrad	MO	campus	student	3	1.17
*Yana Weinstein, Kathleen B. McDermott, Henry L. Roediger	2010	testing frequency	college	undergrad, graduate	MO	campus	student	6	0.92
*Chi-Shing Tse, David A. Balota, Henry L. Roediger	2010	testing frequency	all	all	MO		adults	4	0.24
*Kang, S. H., McDaniel, M. A. & Pashler, H.	2011	testing frequency	college	freshmen	CA	campus	student	1	0.68
*Roediger III, H. L., Agarwal, P. K., McDaniel, M. A. & McDermott, K. B.	2011	retention, testing frequency	K-12	intermediate	WA		student	11	1.01
*Davis, K. A.	2011	testing frequency	college	undergrad	ID	city	student	6	0.29

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Mark A. McDaniel & 4 others	2011	testing frequency	K-12	lower secondary	MO	suburban	student	6	TBA
*Pooja K. Agarwal, Henry L. Roediger	2011	retention, feedback	college	undergrad	MO	campus	student	7	0.33
*Meyer, A. N. D.	2011	testing frequency	college, adults	all	TX	campus, community	student, adult	2	1.33
*Verkoeijen, P. P. J. L., Bouwmeester, S. & Camp, G.	2012	testing frequency	college	undergrad	Netherlands	campus	student	2	0.35
*Lambert, T. & Saville, B. K.	2012	testing frequency	college	undergrad	VA	campus	student	2	0.14
*Francis, A. L. & Barnett, J.	2012	feedback	college	undergrad	MO	campus	student	2	0.27
*Einstein, G. O., Mullet, H. G. & Harrison, T. L.	2012	testing frequency	college	undergraduate	SC	campus	student	1	0.38
*Douglas P. Larsen, Andrew C. Butler, Amy L. Lawson, Henry L. Roediger	2012	testing frequency	college	graduate	MO	campus	student	4	1.29
*Meyer, A. N. D. & Logan, J. M.	2013	testing frequency	college, adult	all	TX	campus, city	student, adult	2	0.84

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Lawrence, N. K.	2013	testing frequency	college	undergrad	VA	campus	student	3	0.30
*Gholami, V. & Moghaddam, M. M.	2013	testing frequency	K-12	upper secondary	Iran	metro	student	1	0.72
*McDermott, K. B., Agarwal, P. K., D'Antonio, L.,	2013	testing frequency	K-12	lower secondary, upper secondary	MO	metro	student	22	0.48
*Cantor, A. D., Eslick, A. N., March, E. J., Bjork, R. A. & Bjork, E. L.	2013	testing frequency	college	undergrad	LA	city	student	9	0.73
*Rawson, K. A., Dunlosky, J. & Sciartelli, S. M.	2013	retention	college	undergrad	OH	city	student	10	1.60
*Mark A. McDaniel & 4 others	2013	testing frequency	K-12	lower secondary	MO	suburban	student	4	1.59
*Ashley N. D. Meyer & Jessica M. Logan	2013	testing frequency	all	all	TX	city	adults	4	0.52
*Douglas P. Larsen, Andrew C. Butler, Henry L. Roediger	2013	testing frequency	college	graduate	MO	campus	student	2	0.58
*Jari Metsamuuronen	2013	testing frequency	college	undergraduate	Finland	campus	student	1	0.82

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Grühn, D. & Cheng, Y.	2014	feedback	college	undergraduate	NC	campus	student	3	0.22
*Fenesi, B., Sana, F. & Kim, J. A.	2014	feedback	college	undergraduate	Canada	campus	student	3	0.78
*Serow, R. C., James, J. D. & Parramore, B. M.	2014	accountability, remediation	K-12	upper secondary	NC	campus	student	12	0.25
*Kulik, J. A. & Kulik, C. C.	2014	feedback	college	undergraduate	MI	campus	student	8	0.21
*Jaeger, A., Eisenkraemer, R. E., & Stein, L. M.	2014	testing frequency	K-12	primary	Brazil	city	student	3	0.64
*Ghysels, J., Haelermans, C. & Prince, F.	2014	feedback	K-12	lower secondary	Netherlands	rural	student	2	0.56
*Rawson, K. A., Wissman, K. T. & Vaughn, K. E.	2015	testing frequency	college	undergraduate	OH	campus	student	1	0.77
*Yue, C. L., Soderstrom, N. C. & Bjork, E. L.	2015	testing frequency	college	undergraduate	CA	campus	student	3	0.39
*Stowell, J.R.	2015	feedback	college	undergraduate	IL	campus	student	1	0.38

Effect of Testing on Achievement, Part 1: Quantitative Studies

Author	Year of pub	Primary focus of study	Level of education	Sub-level of education	Location	Geo-graphic context	Unit of analysis	Number of Effects	Mean Effect size**
*Mulligan, N. W. & Peterson, D. J.	2015	retention, testing frequency	college	undergraduate	NC	campus	student	5	0.18
*Rivas, A.G.	2015	retention, testing frequency	all	all	TX	all	adults	2	0.76
*Pan, S. C., Pashler, H., Potter, Z. E. & Rickard, T. C.	2015	retention, testing frequency	all	all	CA	online panel (Mechanical Turk)	all	2	1.06
*Pan, S. C., Rubin, B. R. & Rickard, T. C.	2015	testing & feedback	college	undergraduate	CA	campus	student	11	1.01
*Khana, M. M.	2015	testing & stakes	college	undergraduate	NE	campus	student	2	0.02
*Downs, S. D.	2015	testing & feedback	college	undergraduate	SC	campus	student	6	0.01
*Pan, S. C., Gopal, A. & Rickard, T. C.	2016	feedback	college	undergraduate	CA	campus	student	5	0.48
*Khana, M. M. & Cortese, M. J.	2016	testing frequency	college	undergrad	NE	all	student	2	0.32
*Becker-Blease, K. A. & Bostwick, K. C. P.	2016	testing frequency	college	undergraduate	OR	campus	student	1	0.04

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** These are average unweighted effect sizes adjusted for measurement imprecision in the dependent variable and, where appropriate, small study sample size.

*** Outlier; could be an error.

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