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State of Research on Giftedness and Gifted Education: A Survey of Empirical Studies Published During 1998–2010 (April)

David Yun Dai[1], Joan Ann Swanson[1], and Hongyu Cheng[2]

Abstract

This study surveyed 1,234 empirical studies on giftedness, gifted education, and creativity during 1998–2010 (April), using PsycINFO database and targeted journals as main sources, with respect to main topics these studies focused on, methods they used for investigation, and the conceptual spaces they traversed. Four main research topics emerged from the survey: creativity/creatively gifted, achievement/underachievement, identification, and talent development. Rich and broad conceptual spaces linking these four categories to their psychological underpinnings and educational implications have been explored by this body of research, though the conceptual spaces are still too loosely organized to be seen as paradigmatic. Several prominent trends are identified, including the emergent qualitative studies (accounting for a quarter of the total studies) and the dominance of descriptive (comparative and correlational) research. Although most psychosocial studies are conducted in the context of gifted education, there still seems to be a gap between theory and practice, between psychological understanding of gifted development and promoting such development through education. More systematic, sustainable programs of research and more coordination among researchers are warranted to move the field forward.

Keywords

philosophical/theoretical, qualitative methodologies, evaluation

Introduction

The field of research on giftedness and gifted education has grown quite rapidly in the past few decades. A preliminary search we conducted in 2009 of the PsycINFO database using the terms *gifted* and *gifted education* resulted in a total of 2,859 records of publication since 1998. This trend is a mixed blessing, however. On one hand, it raised the status of gifted studies as a legitimate and important field that is maturing and poised to support an evidence-based gifted education. On the other hand, stakeholders of giftedness/ gifted education and their interests are so diverse that some scholars feel that the diffuse research efforts may not yield solid, convergent findings to move the field forward (VanTassel-Baska, 2006). Some leaders of the field raised the question of how we compare with other fields, what is the nature of our field, and whether the field of gifted studies (including both the nature and nurture of giftedness) has a scholarly identity after all. A panel of leaders in gifted education concluded that the field can be characterized as fractured, contested, porous rather than unified, insular, and firmly policed (Ambrose, VanTassel-Baska, Coleman, & Cross, 2006). In other words, the field, like those of English

studies and political sciences, is populated with diverse, often internally contested, ideas, and lacks a coherent set of research agendas and a commonly accepted methodology and nomenclature (see also B. Shore, personal communication, November, 2006). Others have garnered efforts to take stock of what is the current state of our knowledge on various aspects of gifted children, life-span development of giftedness, and gifted education (e.g., Cohen, 2006; Horowitz, Subotnik, & Matthews, 2009; Plucker & Callahan, 2008; Robinson, Shore, & Enersen, 2007; Shavinina, 2009; Treffinger, 2009).

What is the nature of our field of research? Is it a discipline or just a loosely organized field of research with a common interest in gifted children and their development and education? Historically, the field consists of two types of

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researchers, one concerned mainly with educating gifted children and serving their distinct needs and the other with psychological underpinnings of giftedness, its nature, and development. Only in more recent decades have they communicated frequently with each other and paid attention to what the other side is doing and has found. Friedman-Nimz, O'Brien, and Frey (2004) surveyed the literature from 1969 to 2000 and concluded that this was a period when research on gifted education, relative to research on giftedness, increased dramatically. Because the field is not a highly structured academic discipline, but a loosely organized consortium of people with distinctive theoretical and practical interests, researchers can come and go as they wish, and many may have just an occasional interest in topics related to giftedness or gifted education. The field is likely to continue to maintain the psychological and educational "wings" of research, and we will continue to have "guest researchers" whose interest in the field is not an enduring one. However, the tendency of research efforts to diverge in numerous directions and have a short "attention span" is disconcerting, as the consequence can be a fragmented, highly idiosyncratic body of research, with no coherent themes and issues, no conceptual clarity and methodological rigor, no agreed-on criteria for judging the merits of a study, and no continuity of research efforts. Several recent surveys of research show that these concerns are not without some basis.

On the psychological side, Ziegler and Raul (2000) reviewed research published in 1997 and 1998 and found that definitions and identification of the gifted used in research tended to be on the basis of practical convenience rather than principled arguments and conceptions, rendering comparison of research studies impossible. They concluded that the field was largely a fragmented one. From a psychological research point of view, lack of consensus of even the basic terminology and definition of what we are trying to understand is a major concern and continues to plague the field, as there is no common basis for comparing and integrating research efforts. On the practical side, Jolly and Kettler (2008) reviewed gifted education research from 1994 to 2003 and judged its efficacy in addressing practical recommendations made by the Department of Education report "National Excellence" (Ross, 1993). They concluded that the research by and large has failed to respond to the priorities set up by this report. VanTassel-Baska (2006) argued that, excepting acceleration and grouping, "few other topics have elicited consistent research over time that coalesces around key ideas to promote effective policy formation or practice" (p. 339). Research coordination becomes crucial when discrepancies have also been identified within the field among practice, research, theory, and philosophy and when there is a lack of research base that can bridge theory and practice (Ambrose et al., 2006). It seems that stocktaking, like a regular "health check," of what has been done (or not been done), what are the prominent trends, and what remains to be done is what the field needs for its well-being and growth.

The purposes of the present project were both descriptive and evaluative. First, we attempted to survey what has been done in terms of empirical research since 1998 to date (April 2010) on the topics of giftedness and gifted education. Specifically, we tried to describe the distribution of major topics of research and major modes of investigation in the field. Second, we tried to identify some prominent issues, themes, and trends emergent from the survey. And finally, we attempted to evaluate the state of research in terms of whether the body of research seems to address theoretically and/or practically important questions and concerns. We identify, albeit tentatively, some challenges and weaknesses in this body of research for the sake of moving the field forward.

Method

PsycINFO was used as a main source of empirical research in the field for this study. We selected PsycINFO mainly for two reasons: Most publications in this database (except for dissertations) are peer-reviewed journal articles, and a large portion of these publications are reports of original empirical studies. There were two criteria for inclusion for this survey: (a) peer-reviewed journal articles or dissertations that report primary empirical studies and (b) articles must be published in English. The former ensured a certain level of "quality control" for those selected studies, and the latter ensured the exclusion of those articles whose quality and adequacy we were not in a position to assess or whose outlets were unknown to us in terms of peer-review status or professional standards. We included dissertations in English language because we believe that they were in general well supervised by qualified professional researchers (typically university professors) and are informative as to the directions the younger generation of researchers is taking.

Procedures of the Search

Two rounds of search were conducted using two terms, *gifted* and *gifted education*. In the first round, we created, using Access, a database of 2,859 articles pulled from PsycINFO, published from 1998 to April 2009. We then examined these articles one by one to determine whether it was an empirical study or theoretical or review article. For the purpose of this survey, an empirical study was defined as a study that systematically collected, analyzed, and presented data on a particular topic. Each abstract was closely read to determine the nature of the study, and when ambiguities occurred, original articles were checked for determination. Technically, an empirical study should have a method section, describing in detail how data were collected, and what procedures and instruments, if any, were used. Nonprimary research (including meta-analysis and review) articles were deleted from the database, with 1,068 remaining as empirical studies. The search results were then narrowed by deleting all articles from non-English language journals. Empirical studies qualified

for inclusion were structured in the Access file by article title, author, journal/source, research type, research method, keywords, and questions or issues.

A second round of search was conducted about a year after the first round and the database was updated through April 2010 using the search terms *gifted* and *gifted education*. In addition, a targeted search was conducted for the period of 1998-April 2010, using the additional terms of *Javits Act*, *creativity and eminence*, *teaching for creativity*, and *teaching higher-order thinking*. Besides, five creativity journals were searched for relevant empirical studies: *Creativity Research Journal*, *Journal of Creative Behavior*, *Thinking Skills and Creativity*, *Creative Child and Adult Quarterly*, and *International Journal of Creativity and Problem Solving* (formerly *Korean Journal of Thinking and Problem Solving*). Additional records found were then added to the Access database established in the first round of search, resulting in 1,234 total records used for coding.

Phase 1: Generating Codes

Open coding. We took an inductive approach by using open coding; whatever key components of the study, the title and abstract indicated were registered as codes. As a trial, the second and third authors first screened and coded more than 500 studies (2003–2006) and resolved initial ambiguities regarding whether a specific study was qualified for inclusion (i.e., whether it is a primary empirical study). Then, the first author re-coded the same set of studies and identified three errors in the initial coding in a memo:

1. *Miscoding*: A study is miscoded when a study is wrongly designated (using the wrong categories or codes). For example, the code "intervention" is assigned for a study of general gifted programming that does not target specific problems and populations.
2. *Overcoding*: A study is overcoded when a code is designated for a study that does not have a relevant empirical component in the research design. For example, some studies may be coded "instruction" but in these studies there was no instructional component empirically investigated, self-reported, observed, experimentally manipulated, or otherwise documented in the study. In other words, any assigned code needs to reflect an empirical component of the study not merely semantic or theoretical concepts mentioned in the study.
3. *Undercoding*: A study is undercoded when a study is empirically investigating an important topic, concept, or practice but it was overlooked and missed for coding. For example, a study investigates "out of level testing" as a way of identification but it is only coded as "identification" and, therefore, missed the specific contribution the study was meant to make.

Of course, there is a trade-off between particularity/ specificity and generality/parsimony. The coding should strike a balance between the two.

This iterative process of open coding was to ensure the reliability or trustworthiness of the coding. Besides this coding guide, a general principle for enhancing coding efficacy is conceptual saturation. Coding of a study is conceptually saturated when the main components of a study are coded, and no further codes of significance can be further extracted from the study as indicated by the title, abstract, and sometimes the article itself.

After the initial coding "trial," the same procedure was repeated with the rest of the studies, with the first author serving the role of supervising, auditing, and editing. As more codes were entered into the coding scheme, terms of codes were formalized to avoid redundancies; sometimes codes were combined thematically (e.g., "motivation" and "self-regulation," "creativity" and "creatively gifted"). In the iterative process, a coding scheme was compiled, yielding a total of 108 codes (see Table 1).

Phase 2: Developing a Taxonomy and Framework

A taxonomy of categories was developed based on (a) whether a code represents high-inference or low-inference categories and (b) whether a code represents some distinct conceptual category (psychological, practical, or contextual, etc.). The resulting taxonomy contains the following eight categories: (a) demographic, (b) contextual, (c) educational practice, (d) domain/ subject matter, (e) technical, (f) educational goals/outcomes, (g) psychological constructs, and (h) theory/interpretive (see Figure 1). What distinguishes between the last two categories is the fact that psychological constructs have direct measurable referents in terms of psychological structures or processes (e.g., "self-concept"), whereas codes in the theory/interpretive category do not have direct referents but instead theoretical and interpretive, meant to organize a complex set of observations (e.g., "perfectionism" or "at risk"). The coding scheme and taxonomy are presented in Table 1.

Results

Result 1: Distributions of Studies by the Types of Outlet (Table 2)

As the sources of empirical studies we gathered were quite distinctive, we first examined whether there are systematic differences in three types of outlets: "gifted" journals, non-gifted journals, and dissertations. We identified *Gifted Child Quarterly*, *High Ability Studies*, *Journal for the Education of the Gifted*, *Journal of Advanced Academics* (formerly *Journal of the Secondary Gifted Education*), and *Roeper Review* as "gifted" journals, and grouped all general educational and

Table 1. Empirically Derived Codes Grouped Under Conceptually Imposed Taxonomy of Categories

Code	Abbreviation	Entries
Research methods		
Quantitative		
Correlational	QC	357
Descriptive-comparative	QD	279
Experimental	QE	86
Longitudinal	QL	42
Survey	QS	130
Qualitative		
Case studies	QCA	142
Interview	QI	115
Narrative	QN	7
Observation	QO	40
Mixed (both quantitative and qualitative)	QM	36
Research topics and issues		
Demographic category	D	84
College/adulthood	CA	70
Elementary/childhood	EC	140
Gender	G	145
Minority/underrepresented	MU	121
Preschool	PRE	32
Secondary/adolescence	SA	248
Domain/subject matter category	DS	73
Art/music	AM	48
Leadership potential	LP	16
Literacy/language arts	LL	29
Mathematics	MAT	71
Science	SC	35
Social studies	SS	2
Visual-spatial	VS	12
Educational goals and outcomes category	EGO	334
Achievement (underachievement)	AU	179
Career/career development	CCD	53
Student needs	SN	19
Talent/talent development	TT	107
Educational practice category	EP	334
Advocacy/public policy	AP	18
Career/career development	CCD	52
Competition	CMP	4
Counseling/guidance	GU	15
Curriculum	CUR	14
Curriculum acceleration	CAC	22
Curriculum compacting	CCC	2
Curriculum enrichment	CE	23
Curriculum grouping	CG	2
Diagnosis/intervention	DI	68
Differentiation	CD	35
Gender role	GR	5
Home schooling	CH	1
Homework	H	1
Identification	ID	144
Instruction	I	70
Learning style/preferences	LSP	24
Mentorship/tutoring	MT	8

(continued)

Table 1. (continued)

Code	Abbreviation	Entries
Out-of-school activities	CO	14
Physical activities	CPA	18
Programming	PG	73
Program evaluation	PEV	50
Service learning	CSL	2
Stereotyping	STE	9
Teacher/teacher education	TE	15
Teacher perceptions, beliefs, and knowledge	TB	76
Teacher professional development	TD	26
Technology	IT	16
Psychological construct category (having direct, specific referents)	PC	232
Attention deficit/hyperactivity disorder	ADH	4
Asynchrony	ASY	1
Boredom	BOR	3
Cognitive processes/styles	CPS	61
Depression/anxiety	DA	10
Divergent thinking	DT	35
General intelligence (IQ)	IQ	40
Handedness	HAN	2
Humor	HU	1
Interest	INT	14
Moral reasoning	MR	11
Motivation/self-regulation	MSR	75
Multipotentiality	MUL	2
Neurophysiological	NP	29
Precocity	PRC	11
Problem solving	PRS	28
Self-concept	SCE	69
Self-efficacy	SF	18
Sexuality	SEX	1
Social comparison	SLC	46
Social coping	SOC	26
Suicide	SUI	5
Sociocontextual category	CX	88
Culture	CU	73
Home environment	HE	49
Leisure	LI	1
Parent/parenting	PAR	29
School environment	SE	78
Social barriers	SB	5
Technical category	T	102
Assessment	ASS	42
Measurement/psychometric	MP	137
Theoretical/interpretive category (abstract categories)	IC	223
At risk	AR	26
Cognitive/physical development	CPD	35
Conceptions of giftedness	CCG	23
Creativity/creatively gifted	CRG	194
Disability/twice exceptionalities	DTE	54
Diversity of giftedness/gifted students	DV	31

(continued)

Table 1. (continued)

Code	Abbreviation	Entries
Expertise	EXP	2
Genius/prodigy	GP	8
Identity	IDT	9
Intelligence/intellectual development	IID	55
Inventor	IN	3
Overexcitability	OX	11
Perfectionism	PF	25
Personality/temperament	PT	53
Psychological disorders/mental health	PMH	35
Socioemotional	SOE	88
Spirituality	SPI	3
Verbal	V	4

Note. There are a total of 1,234 entries for empirical studies 1998–2010 (April).
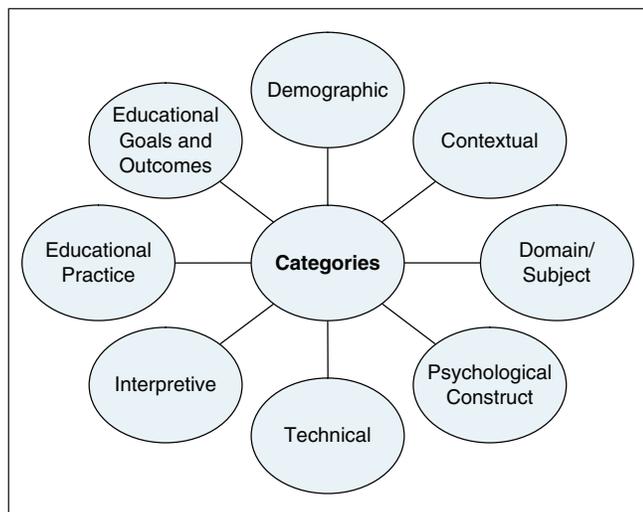
Figure 1. A taxonomy of broad categories subsuming all 108 codes

psychological journals as "nongifted." Dissertations form the third category, as they constitute a unique type of contribution and contributors with main professors as their own "gatekeepers."

Proportionally, "gifted" journals published more educational research than "nongifted" journals (40% vs. 29%), and the latter published more psychological studies than the former (45% vs. 32%). Studies published in "gifted" journals were also more sensitive to social-contextual factors. "Nongifted" journals published slightly more technically oriented studies, such as measurement, psychometrics, and assessment systems than "gifted" journals (10% vs. 6%). Distributions of dissertation topics are quite balanced in comparison.

Result 2: Frequencies of Quantitative Methods Used for Substantive Topics (Table 3)

As a first step to analyze data, we investigated dominant modes of investigation by looking at the distribution of methods. We developed three broad categories based on the convention of educational research: quantitative, qualitative, and mixed. There are five subcategories under quantitative (experimental, descriptive-comparative, correlational, longitudinal, and survey) and four subcategories under qualitative (interview, case studies, observation, and narrative). As shown, the predominant mode of investigation was quantitative ($n = 894$), followed by qualitative ($n = 304$) and mixed methods ($n = 36$); the qualitative research makes a quarter (25%) of the total research. The results suggest that although the traditional quantitative (particularly descriptive) methods still dominate the field, qualitative methods have made inroads. To corroborate this observation, in a review of qualitative studies published during 1991–2003, the total number of included studies published during 1991–1997 was 14, whereas the number of included studies published during 1998–2003 was 45 (see Coleman, Guo, & Dabbs, 2007), tripling the number of studies in the previous 7 years. For each category or subcategory, we identified its closely associated substantive categories; in other words, we tried to determine what methods were used most frequently for a particular topic, construct, or issue. The results for quantitative methods across substantive topics are presented in Table 3.

As shown in Table 3, of all the codes generated from this body of research, the topics most frequently associated with the quantitative methods are creativity/creatively gifted (18%), measurement/psychometric (15%), achievement/underachievement (14%), identification (13%), self-concept/self-esteem (7%), talent/talent development (7%), mathematics (7%), social-emotional (7%), motivation/self-regulation (6%), intelligence/intellectual development (6%), cognitive processes/styles (6%), instruction (5%), diagnosis/intervention (5%), and teacher beliefs (5%). As can be seen, the quantitative research is predominantly psychosocial in nature (except for identification and instruction).

For a breakdown of quantitative methods, descriptive-comparative and correlational designs combined ($n = 636$) account for 71% of the 894 quantitative studies. The numbers of experimental studies ($n = 86$) and longitudinal studies ($n = 42$) are relatively small. For each quantitative method, most frequent research topics and concepts are presented in Table 3 (right column). As shown, the topic of creativity/creatively gifted figures prominently across the descriptive and experimental methods (16% of the total descriptive studies and 26% of the total experimental studies). The topics of measurement/psychometric, achievement/underachievement, and identification are most frequently associated with the descriptive-comparative and correlational studies but not in experimental studies. The topic of mathematics is featured prominently

Table 2. Types of Outlets and Number of Studies per Category

Outlet/category	Educational	Psychosocial	Sociocontextual	Technical	Total
Nongifted	131 (29%)	203 (45%)	70 (16%)	43 (10%)	447
Gifted	203 (40%)	161 (32%)	113 (22%)	34 (6%)	511
Dissertations	102 (37%)	90 (33%)	61 (22%)	23 (8%)	276
	436	454	244	100	1,234

Note. Nongifted = journals that are not specialized in giftedness or gifted education; Gifted = journals that are specialized in giftedness and gifted education. Percentages in parentheses are relative to the total number of studies in each outlet.

Table 3. Frequencies of Quantitative Methods Used for Substantive Topics

	Topics and concepts		Topics and concepts
Quantitative (894)	Creativity/creatively gifted 163 (18%)	Correlational (n = 357)	Measurement/psychometric 85 (24%)
	Measurement/psychometric 131 (15%)		Creativity/creatively gifted 76 (21%)
	Achievement/underachievement 126 (14%)		Identification 61 (17%)
	Identification 114 (13%)		Achievement/underachievement 60 (17%)
	Talent/talent development 67 (7%)		Intelligence/intellectual development 34 (10%)
	Self-concept/self-esteem 63 (7%)		Self-concept/self-esteem 26 (7%)
	Social-emotional 60 (7%)		Talent/talent development 26 (7%)
	Mathematics 59 (7%)	Longitudinal (n = 42)	Achievement/underachievement 13 (31%)
	Motivation/self-regulation 54 (6%)		Creativity/creatively gifted 11 (26%)
	Intelligence/intellectual development 53 (6%)		Mathematics 6 (14%)
	Cognitive processes/styles 50 (6%)		Talent/talent development 5 (12%)
	Instruction 46 (5%)		School environment 4 (10%)
	Diagnosis/intervention 45 (5%)	Survey (n = 130)	Teacher beliefs 23 (18%)
	Teacher beliefs 45 (5%)		Identification 17 (13%)
Experimental (n = 86)	Creativity/creatively gifted 22 (26%)		Programming/program evaluation 15 (12%)
	Instruction 21 (24%)		Social-emotional 14 (11%)
	Diagnosis/intervention 11 (13%)		Talent/talent development 12 (9%)
	Mathematics 11 (13%)		Diagnosis/intervention 11 (8%)
	Cognitive processes/styles 10 (12%)		
	Achievement/underachievement 9 (10%)		
	Talent development 8 (9%)		
Descriptive-comparative (n = 279)	Creativity/creatively gifted 44 (16%)		
	Measurement/psychometric 35 (13%)		
	Achievement/underachievement 34 (12%)		
	Identification 29 (10%)		
	Cognitive processes/styles 23 (8%)		
	Mathematics 19 (7%)		
	Self-concept/self-esteem 16 (6%)		
	Motivation/self-regulation 16 (6%)		

Note. The numbers indicate the total counts of studies under the given method using that category or concept.

across descriptive and experiment modes of investigation. A small but notable portion of experimental studies focused on instruction and diagnosis/intervention. In general, experimental designs seemed to be underutilized compared with other quantitative methods, accounting for less than 10% of the total quantitative study.

Result 3: Frequencies of Qualitative Methods Used for Substantive Topics (Table 4)

Table 4 presents the results of frequencies of qualitative methods mostly associated with various substantive topics. The topics most frequently studied by qualitative methods,

in the order of prevalence, are as follows: achievement/underachievement (15%), creativity/creatively gifted (10%), talent/talent development (12%), school environment (11%), teacher beliefs (9%), programming/program evaluation (9%), social-emotional (9%), identification (9%), instruction (7%), disability/twice exceptionalities (8%), and motivation/self-regulation (5%). Similar to the quantitative-descriptive research, achievement/underachievement has the largest share of qualitative studies. However, school environment, teacher beliefs, disabilities/twice exceptionalities do not feature in the "quantitative" list, indicating differing research foci. In general, qualitative research seems to go in a direction that is more "clinical" and local, sensitive to school contexts

Table 4. Qualitative and Mixed Methods Used for Substantive Topics

	Topics and concepts		Topics and concepts
Qualitative (N = 304)	Achievement/underachievement 46 (15%) Creativity/creatively gifted 29 (10%) Talent/talent development 35 (12%) School environment 34 (11%) Teacher beliefs 28 (9%) Programming/program evaluation 28 (9%) Social-emotional 26 (9%) Identification 26 (9%) Instruction 22 (7%) Disability/twice exceptionalities 23 (8%) Motivation/self-regulation 16 (5%)	Interview (n = 115)	Achievement/underachievement 18 (16%) Teacher beliefs 18 (16%) School environment 17 (15%) Talent/talent development 14 (12%) Programming/program evaluation 11 (10%) Creativity/creatively gifted 11 (10%) Social-emotional 9 (8%)
		Case studies (n = 142)	Achievement/underachievement 24 (17%) Disability/twice exceptionalities 17 (12%) Talent/talent development 16 (11%) Identification 15 (11%) School environment 15 (11%)
Mixed (N = 36)	Achievement/underachievement 7 (19%) School environment 6 (17%) Talent-talent development 5 (14%) Motivation/self-regulation 5 (14%) Identification 4 (11%) Programming/program evaluation 4 (11%)	Observation (n = 40)	Identification 6 (15%) Instruction 5 (13%) Programming/program evaluation 5 (13%) Cognitive processes/styles 5 (13%) Social-emotional 4 (10%) Diagnosis/intervention 3 (8%)
		Narrative (n = 7)	N/A

Note. The numbers indicate the total counts of studies under the given method using that category or concept.

Table 5. Four Central Topics and Their Associations With Other Categories and Concepts

Topics	Domain/context/technical	Psychosocial	Educational
Creativity/creatively gifted (n = 194)	Art/music 18 Secondary school/adolescence 23 Elementary school/childhood 17 Measurement/psychometric 25 Talent/talent development 11	Personality/temperament 19 Intelligence/intellectual development 17 Motivation/self-regulation 14 Psychological disorders/mental health 13 Divergent thinking 14 Cognitive processes/styles 10 Problem solving 7	Instruction 11 Teacher beliefs 9
Achievement/ underachievement (n = 179)	Mathematics 13 Secondary school/adolescence 49 Gender 33 Minority/underrepresented 28 Career/career development 11	Self-concept/self-esteem 22 Motivation/self-regulation 20 Social-emotional 12 Social comparison 10 At risk 9	Home environment 12 School environment 12 Identification 11
Identification (n = 144)	Minority/underrepresented 34 Measurement/psychometric 49 Talent/talent development 14	Achievement/underachievement 11 Conceptions of giftedness 8 Diversity of giftedness 9	Teacher beliefs 18 Programming/program evaluation 15
Talent/talent development (n = 93)	Art/music 20 Mathematics 16 Gender 16 Secondary school/adolescence 16	Creativity/creatively gifted 11 Achievement/underachievement 8 Precocity 7	Identification 14

Note. The numbers indicate the total counts of studies under the given topic using that category or component.

and practice, and more likely of the "educational" rather than "psychological" research.

To break down the qualitative methods, interviews and case studies combined (n = 257) account for 85% of the total qualitative studies. Although the topics of achievement/ underachievement, talent/talent development, and school environment cut across both quantitative methods, teacher beliefs featured more prominently in interview studies, so did disabilities/twice exceptionalities in case studies.

Result 4: Central Research Topics and Associated Concepts and Categories (Table 5)

In an effort to identifying most distinct research issues, themes, and trends, and how they were conceptualized in research, we identified central research topics in this body of literature and examined how they were most frequently related to other codes in the demographic, contextual/practice, domain/subject, educational goals/outcomes, psychological

constructs, and theory/interpretive categories, as set up in the coding framework (see Table 1).

Central research topics are overarching in a sense that they organize derivative categories and concepts around them. Linking these categories to central research topics was done at an aggregate level and, thus, does not mean that each individual study was in fact conceptualized this way. Rather, imagine that all researchers were de facto mapping out or searching through a public conceptual space that is shared to some degree by the members of a research community in terms of its components, structure, and meanings. Each researcher's conceptual space overlaps with others. In a highly disciplined research community, community members share the same conceptual space so that most researchers are focused on a common set of concepts, issues, and theories, and share a common set of methodologies, hence, "normal science" according to Kuhn (1962). In contrast, in a loosely organized research community, the conceptual space can be diffuse, or even disorganized and idiosyncratic. Therefore, by examining the aggregated picture, we will have a better sense of how, at the collective level, the research community conceptualized a specific research topic or problem over the past 12 years or so.

The central research topics we identified during 1998–April 2010 are the following: (a) creativity/creative gifted, (b) achievement/underachievement, (c) talent/talent development, and (d) identification. The studies covering these four topics ($n = 570$, counting off overlaps) account for 46% of the total studies. As some high-frequency codes such as motivation/self-regulation or self-concept/self-esteem significantly overlap with a major topic such as achievement/underachievement, we decided not to list them separately as central topics but rather treat them as being subsumed by the central topics. When these derivative concepts and categories are taken into account, the total studies accounted for amount to about 80%. In the following section, codes and categories closely associated to these central topics are presented.

The term *creativity/creatively gifted* (CRG; $n = 194$) encompasses studies on all aspects of creative persons, processes, and contexts, sometimes focused on creative potential and sometimes on its mature expressions in various domains. Some of the studies were conducted within the gifted field and others had a more general interest in creativity itself. This category of research examined creativity in its relations with personality and temperament (PT; $n = 19$), intelligence/intellectual development (IID; $n = 17$), and psychological disorders/mental health (PMH; $n = 13$). Art/music featured prominently (AM; $n = 18$). Underlying processes such as motivation/self-regulation (MSR; $n = 14$), divergent thinking (DT; $n = 14$), cognitive processes/styles (CPS; $n = 10$), and problem solving (PRS; $n = 7$) were explored. Measurement and psychometric (MP) issues related to assessing creativity were examined ($n = 25$). Educationally, instruction (I) was concerned ($n = 11$) and so was teacher beliefs (TB; $n = 9$).

Achievement/underachievement (AU; $n = 179$) represents a psychosocial as well as educational aspect of gifted education and constitutes a standard gifted education topic. For this key topic, many demographic and contextual variables were considered. Secondary school/adolescence (SA; $n = 49$) was more of a focus compared with elementary school/childhood (EC; $n = 16$) or college/adulthood (CA; $n = 17$). Some studies examine gender (G; $n = 33$) and minority/underrepresented students (MU; $n = 28$). In the contextual category, school environment (SE; $n = 12$) and home environment (HE; $n = 12$) were highlighted. In terms of possible psychosocial underpinnings of underachievement, motivation/self-regulation (MSR; $n = 20$) was examined; self-concept/self-esteem (SCE; $n = 22$) was explored, sometimes in conjunction with social comparison (SLC; $n = 10$), particularly during adolescence (SA; $n = 23$); and socioemotional factors (SOE; $n = 12$) were explored, in conjunction with social coping (SOC; $n = 12$), particularly during adolescence (SA; $n = 23$). Some diagnosis/intervention studies (DI; $n = 11$) were conducted on this central topic.

Identification (ID; $n = 144$) is one of the most researched topics. For this topic, minority/underrepresented (MU; $n = 34$) featured prominently, which is not surprising given the emphasis on identifying underrepresented groups in recent years. It is also noteworthy that 14 studies were concerned with identification during preschool years (PRE). As expected, a large proportion of identification studies focused on measurement and psychometrics (MP; $n = 49$). However, researchers also studied teacher beliefs (TB; $n = 18$), programming (PG; $n = 15$), and talent development (TT; $n = 14$) in relation to identification, indicating a more context-specific approach. Only seven studies explicitly used an IQ definition or criterion for identification, which is quite low, in light of its historical dominance in the field. In contrast, 17 studies put identification in the context of conceptions of giftedness (CCG; $n = 8$) or diversity of giftedness/gifted students (DV; $n = 9$).

Talent/talent development (TT; $n = 107$) as a central topic encompasses a range of studies on domain-specific manifestations of high ability and their development. Domains highlighted in this body of research were art and music (AM; $n = 20$) and mathematics (MAT; $n = 16$). It is also related to creativity/creatively gifted (CRG; $n = 11$). Gender (G; $n = 16$) and secondary school/adolescence (SA; $n = 16$) were two prominent demographic features.

For the four central topics, a probe was conducted to see how many studies were driven by "issues" or "theories." For example, putting identification (ID) in the context of conceptions of giftedness (CCG) or diversity of giftedness/gifted students (DV) is more "theoretical" than merely describing psychometric properties of some identification instruments; likewise, putting self-concept/self-esteem (SCE) in the context of perfectionism (PF) or "at-risk" students (AR) is more "theoretical" than merely describing a correlation between self-concept and achievement. For the sake of analysis, we

operationalized a "theory-driven" or "issue-driven" study as the one that used one or more interpretive/theory categories (based on the coding framework; Table 1) to frame the research. The following are results: Of the 194 creativity studies, 65 (34%) used interpretive categories. Of the 179 studies on achievement/underachievement, 64 (36%) used interpretive/theory categories. The number is 38 (26%) for the 144 studies on identification and 34 (37%) for the 93 studies on talent/talent development. Taken together, they suggest that about one third of the total studies on the four central topics were "theory-driven" or "issue-driven."

In sum, researchers have explored a rich conceptual space, and their conceptualizations of the same problem have similarities and overlapping concerns and underpinnings, though one may argue that the conceptual connections are still too loose to be seen as "paradigmatic" or even "pre-paradigmatic." Only a third of the research can be described as "theory-driven" or "issue-driven." As a caveat, these results should be seen as a rough estimate, as some studies may not state their guiding framework explicitly enough to be registered in the coding system as "interpretive" codes.

Result 5: Identification of the Topics Investigated and Methods Used by Most Prolific Researchers (Table 6)

As a final step, we identified 13 most prolific contributors (including research teams) who contributed 10 or more empirical studies during 1998–April 2010. Sampling this small group can be seen as a case study within this survey to take a closer look at individual trees in the midst of the forest we are surveying and give the study a little more depth and detail.

As shown in Table 6, all these contributors are university-based researchers who either ran gifted programs or had well-developed research programs. Almost all of them can be seen as working within the field of giftedness and gifted education. Together, their research has roughly the same 3:1 ratio of quantitative/qualitative designs as shown for the entire body of research surveyed in this study. A close inspection of their contributions indicates that 60% are psychosocial studies, 30% educational, and 10% studies that mixed educational and psychological issues, which is also in keeping with the whole body of research. In general, most of these researchers are focused on generating knowledge useful for gifted education rather than studying giftedness purely from a psychological perspective. About 60% of the studies either intentionally explored education-related issues or suggest educational implications of the studies, thus close to what Stokes (1997) called "use-inspired research" (see more discussion later). The four central topics identified in the survey are well represented in the research conducted by this group of prolific researchers. Particularly distinct is a focus on achievement/underachievement. Diversity of interests and orientations is also obvious among these researchers. But levels of systematicity and coherence of research themes differ. Research programs by Hébert, Lubinski, Benbow, and their colleagues, and Van Tassel-Baska seem most consistent (achievement/underachievement of minority/underrepresented gifted adolescents, predicting long-term outcomes of talent development, and curriculum development and evaluation, respectively). These contributors differed in how wide a range of topics they investigated. David Chan's research, for example, encompassed as many as 18 psychosocial and educational themes. The hedgehog versus fox metaphor applies here: Some researchers have a wider range of research interest than others—some are synthesizers and others are analyzers. This sample provides a good occasion for exploring how specific methodologies are enlisted to tackle a research problem. It is not without reason that Hébert's program was distinctly qualitative in nature and Lubinski and Benbow's program was quantitative. The methodology they adopted was well suited to address their respective concerns and problems (e.g., understanding underachievement of minority students vs. predicting long-term talent development and creative productivity).

Discussion

Before reflecting on the results of this survey, a summary of major observations are listed as follows:

- Quantitative methods of investigation still dominate research in the field, though qualitative research has made inroads and accounts for a quarter of the total studies. Compared with the quantitative tradition, qualitative research tends to be more sensitive to educational and social contexts, and more educationally oriented.
- Creativity/creatively gifted, achievement/underachievement, identification, and talent/talent development constitute four most frequently researched topics and account for almost half of the 1,234 studies surveyed.
- Rich and broad conceptual spaces linking these main topics to their psychosocial underpinnings and educational implications have been explored, though they are still too loosely organized to be seen as paradigmatic.
- Only one third of the studies on the four central topics can be characterized as "theory-driven" or "issue-driven."
- Most prolific researchers in the field are representative of the overall trends in terms of methodology as well as substantive topics; most of their research was conducted in the context of gifted education, seeking understanding of underlying psychosocial issues and effective educational practices.

Table 6. Most Prolific Researchers (Teams) and Their Research Topics During 1998–2010 (April)

Authors and number of publications, sole or coauthored	Methods used	Psychosocial	Educational
Chan, David—26	Predominantly quantitative/ correlational or descriptive-comparative 15	Intelligence/intellectual development 10 Social-emotional 6 Leadership 4 Creativity 4	Programming/program evaluation 2 Instruction 1
Hébert, Thomas—15	Predominantly qualitative/ case studies and interview 15	Achievement/underachievement 10 Adolescent 5 College 5 Minority/underrepresented 4	Student needs 1 Curriculum differentiation 1 Mentoring-tutoring 1
Lubinski, David and Benbow, Camilla—14	Predominantly quantitative/ correlational or longitudinal 11	Talent/talent development 7 Career/career development 4 Mathematics 5 Creativity 2	Identification 1 Programming 1
Olszewski-Kubilius, Paula, and Lee, Seon-Young—13	Mixed; 9 quantitative and 4 qualitative	Talent/talent development 4 Gender 2	Acceleration/enrichment 6 Out-of-class activities 3 Identification 2 Programming/program evaluation 4
Worrell, Frank—12	All quantitative/correlational or descriptive-comparative 12	Measurement/psychometric 5 Cognitive processes/styles 2	Programming/program evaluation 1 Instruction 1 Homework 1 Literacy/language arts 1
Neumeister, Kristie—12	Mixed; 7 qualitative and 5 quantitative	Achievement/underachievement 6 Perfectionism 4 Motivation/self-regulation 2	Programming/program evaluation 1 Curriculum differentiation 3 Mentoring/tutoring 1
Van Tassel-Baska, Joyce—12	Predominantly quantitative 12	Motivation/self-regulation 1 Achievement/underachievement 1	Programming/program evaluation 4 Identification 3 Curriculum/enrichment 2 Literacy/language arts 2 Teacher perceptions/belief 3
Reis, Sally—12	Mixed; 3 mixed, 6 quantitative, and 3 qualitative	Achievement/underachievement 4 Gender 3 Talent development 2 At risk 2	Identification 1 Curriculum compacting 1 Instruction 2 Enrichment 1
Cross, Tracy—10	Mixed; 7 quantitative and 3 qualitative	Adolescent/secondary 5 School environment 3 Psychometric 3 Suicide 2	Identification 1 Acceleration/enrichment 2 Teacher professional development 1
Gentry, Marcia—11	Mixed; 9 quantitative and 2 qualitative	Secondary/adolescence 5 School environment 3 Measurement/psychometric 3 Minority/underrepresented 1	Programming/program evaluation 3 Curriculum/enrichment 1 Instruction 1
Plucker, Jonathan—10	6 quantitative, mostly correlational, 4 qualitative, interviews or case studies	Secondary/adolescence 3 Divergent thinking 3 Measurement/psychometric 2 Creativity/creatively gifted 3	Programming/program evaluation 2 Instruction 1
Runco, Mark—10	All quantitative, 6 correlational	Creativity/creatively gifted 6 Divergent thinking 7 Secondary/adolescence 2	Instruction 1 Physical activities 1
Swiatek, Mary-Ann—10	All quantitative, mostly descriptive/correlational	Elementary/childhood 5 Gender 3 Social coping 3 Self-concept/self-esteem 2	Identification 3 Mathematics 2 Programming/program evaluation 1

Note. The numbers indicate the total counts of studies using that category or concept.

Evaluation of this body of research based on a survey like this is can only be made on a highly tentative basis, as the quantity is not all that can tell. Nevertheless, we can make a preliminary judgment of whether the limited resources are properly invested on issues and problems we deem urgent and pressing. Furthermore, we can ask whether methodological

tools are aptly used to facilitate investigation of these issues. And finally, in the larger context of the call for "paradigm shift," we can ask whether conceptual advances made in the past decade or so were followed up by research efforts or whether there is an empirical lag for that matter.

Divergence and Convergence of Research on Giftedness and Gifted Education

The four most researched topics indicate a tendency to focus on more practical issues, such as enhancing creativity, tackling underachievement and social-emotional issues, and examining alternative ways of identification in gifted education. Overall, the results of this survey show many new directions, such as a distinct focus on talent/talent development, identification of minority/underrepresented populations, and the role of motivation and self-regulation in gifted development. However, the body of research overall does not evidence a systematically coordinated research agenda.

As we pointed out in the beginning of this article, gifted studies are a loosely organized field of research rather than a discipline, with researchers coming from different backgrounds, with different theoretical and practical interests. The most stringent definition of research "paradigm" includes a set of canonical research topics as well as conceptual tools, methodological procedures, and criteria agreed on by a research community as the standard or norm for conducting research in the field (Kuhn, 1962). The field of research on giftedness and gifted education simply does not have such coherence and stringency. It is unrealistic, even undesirable, to emulate formal disciplines in their paradigmatic approaches, in terms of high levels of consensus on targeted phenomena, definitions, concepts, theories, and methodologies (including measurement). However, it does not mean that the field cannot develop a common research agenda and set up research priorities and more rigorous standards (Callahan & Moon, 2007; Ziegler & Raul, 2000). The body of research we surveyed shows no evidence of such convergence. Without such convergence and coordination among researchers, cumulated knowledge gains are not possible. At a minimum, we can ask how a common classification (taxonomy) of research can be developed and what kinds of theories and methodologies support a particular endeavor.

To illustrate what we mean, qualitative research has emerged as a new mode of investigation, largely because it affords an up-close look at individual students and school and home situations rather than being purely based on remotely fashioned "universal" constructs. For example, Hébert's (2001) research looked at the lives of urban, Black students in detail. A deep understanding of their achievement or underachievement could not be reached if it were not for the qualitative methods he used. This trend indicates good progress (see Coleman et al., 2007, for a critique of qualitative research in the field). However, we also witness a

large body of descriptive research conducted in the absence of clear articulation of pressing problems, driving questions, and guiding theoretical frameworks. Description of various psychosocial or educational characteristics for the sake of description would not get us very far.

We also argue that overrelying on a specific method, say, correlational design, can also create methodological artifacts. For example, as pointed out decades ago by Cronbach (1957), correlational designs tend to highlight individual differences (traits) at the cost of obscuring situations and processes. As a case in point, of the studies coded "achievement/ underachievement," about a third ($n = 60$) are correlational in nature. In general, very few quantitative-descriptive studies include educational practice categories. This suggests that the correlational research on achievement and underachievement of gifted students was not well *situated* in educational contexts, related to educational practices, which were at least partly responsible for observed patterns of achievement or underachievement. Understandably, a sound metrics of educational practice is hard to come by and different practices typically display qualitative rather than quantitative differences, thus not amenable to quantification and correlational research. However, correlational studies by design biases the findings in favor of dispositional attributions (associated achievement/underachievement with individual characteristics rather than school or/and home situations). This problem is somewhat alleviated by the fact that many qualitative research have examined situational variables for potential explanations for achievement/ underachievement. Nevertheless, we need to heed the methodological limitations.

In sum, given the increasing divergence of research topics, questions, concepts, and methods, there is a more urgent need for discipline, which includes more convergence in definitions and clearer conceptual frameworks, and more rigor in methodologies, lest we are building a babble, full of "sound and fury" with no common basis for understanding and communication.

Bridging the Theoretical and Practical: Toward "Use-Inspired" Research

The field is historically featured by two parallel research traditions, one focused on psychosocial underpinnings of giftedness and the other on educational practices (i.e., gifted education). This survey does not find any change, as the categories of psychosocial and educational research are still largely separate. Is there any hope these two traditions of research can better communicate with and inform each other? We might resort to Stokes's (1997) classification framework, which is based on two dimensions (high or low in search of fundamental understanding and high or low in exploring and evaluating usefulness of certain practices or products). They result in three main categories of research: Bohr's quadrant (basic), Pasteur's quadrant (use-inspired),

and Edison's quadrants (purely applied, practice-driven). Basic research (e.g., purely psychological studies of giftedness), although meaningful in its own right, does not translate easily into innovative and effective educational practice. Many educators might find psychological studies of giftedness not particularly "useful" or practically inspiring. On the other hand, purely practice-driven or action research without being guided by theory can be shortsighted and lacking in heuristic value and generalizing power. Arguably, research in Pasteur's quadrant (use-inspired) is what we need in the field, that is, the kind of research that focuses on how well-designed practices or artifacts interact with and change learning and human development in a fundamental way. How many of the studies in this body of research fit this category? To be sure, in most of the studies we sampled from the top-13, most prolific researchers studied psychological issues in the context of gifted education. However, only 10% of their studies contain codes that cut across both psychological and educational categories, that is, psychological underpinnings or effects of specific educational practices were jointly studied. We surmise that a disconnect between those whose research interests are mainly practical and those whose interests are mainly theoretical is still quite prevalent in the field. For example, most research on instruction included in this survey was not associated with psychological categories such as motivation, learning style, cognitive processes/style, or problem solving. The exception was divergent thinking and creativity. By and large, the number of studies that integrated educational practice and psychological constructs is relatively small. We need more applied research that is truly use-inspired, making the issue of "what works" (practice) and "why it works" (theory) for various kinds of gifted students more distinct and clear. In short, we need more educational intervention studies that are either well grounded in theory or intended to build new theory-driven practical models.

Conducting Research in the Context of New Understandings of Giftedness

Friedman-Nimz et al. (2004) concluded, based on their survey of research during 1969 to 2000, that a paradigm shift in research has not happened. If paradigm shift is more loosely defined as a radical change in the way we think about the nature of giftedness and talent, and the goals and practices of gifted education, we clearly see debates and tensions alluding to such a "paradigm shift" (e.g., Borland, 2003; Horowitz, Subotnik, & Matthews, 2009; Treffinger & Feldhusen, 1996; see Dai, 2010, for a review). However, we can make a general argument that empirical research lags behind in this regard. For example, the paradigm shift, if any, has been partly shaped by research in the cognitive psychology, particularly with respect to how expertise develops (Ericsson, 2006). The expertise perspective, for better or worse, rocks the foundation of our conceptions of giftedness (see Ericsson, Nandagopal, & Roring, 2005, 2007). Yet out of the studies conducted during 1998–2008, only two studies explicitly built on the expertise research and made connections between expertise and gifted development: one outside our field (Amidzic, Riehle, & Elbert, 2006) and the other published in this journal (Kaufman, Gentile, & Baer, 2005). It does not mean, of course, that one has to accept the expertise view of how talent develops in a wholesale fashion (see Gagné, 2009, for a critique of the expertise perspective on giftedness). However, progress can only be made when researchers in the gifted field are sensitive and open to new advances in psychological and educational research outside of the field. At a more practical level, Jolly and Kettler (2008) suggested that there is a disconnect between recommendations by the Department of Education report "National Excellence" (Ross, 1993) and actual research priorities and practices. We need more research that respond to the debates on theoretical and practical issues and address pressing concerns that have important implications for educational policy and practice.

In sum, the field needs more systematic, sustainable programs of research, coupled with more sophisticated methods of inquiry. There is also a need for more cooperation and coordination among researchers in the field so that their research efforts will be more connected and built on each other's work to form a promising trajectory, tractable over time. Finally, the field needs more research that is use-inspired, based on current understandings of the nature and development of giftedness, developing innovative theories of practice through programming and intervention research situated in practical settings.

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