Detlef Urhahne, Lok Hang Ho, Ilka Parchmann, and Sabine Nick also focus on exceptional achievements by pupils in the natural sciences. The authors try to predict success in the qualifying round of the IChO on the basis of the expectancy-value model of achievement motivation by Eccles et al. (1983). The IChO is an international competition open to secondary students up to the age of 20 conducted in partnership with the United Nations Educational, Scientific and Cultural Organization that has been held annually in different countries since 1968. Four-member teams from more than seventy nations compete in theoretical and practical chemistry tasks in order to win awards and promote understanding among nations. The authors examined the participants from the third of four qualifying rounds of the IChO in Germany in order to understand how well various variables such as intelligence, prior achievements, motivation, emotion, and parental support predict test performance in the competition. The results indicate substantial gender differences with respect to the variables they examined. These results may be helpful in developing an explanation of why the participation rates of girls in the German IChO remain quite low. All in all, the model presented by Eccles et al. appears to do a good job of predicting test performance in the competition. It should be kept in mind, however, that the strongest predictor was whether or not one had previously participated in the IChO. And an important limitation of the study, its relatively small sample size, should also be stressed. Nevertheless, the results present us with evidence which can help us in continuing to take steps towards reducing gender differences and promoting all talented students in the sciences.

This issue of *High Ability Studies* concludes with a methods article. While almost all countries have discontinued the exclusive, single-criterion use of intelligence test scores when selecting students for giftedness promotion measures (e.g. schools for gifted students), most educational systems still use them as one of a number of criteria. Javier Tourón, Luis Lizasoain, and Luis Joaristi present the Spanish version of the School and College Ability Test (SCAT), which was developed at Johns Hopkins University for identifying students with high intellectual abilities. The Spanish version measures verbal and quantitative ability in primary and high school settings. The authors test the dimensional structure of the translated version of the SCAT and report on preliminary results of the norming and validation process.

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Exceptionality and gifted education: a re-examination of its hard core

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The commentaries to our target article *Towards a systemic theory of gifted education* differed in their assessments of the various arguments we put forward. Of the more than 40 responses to our target article, 27 responses were chosen as being representative of all commentaries. We grouped the responses according to the main points in our target article, including our claims that current approaches to gifted education are ineffective, current models of giftedness are generally flawed, and systemic models of giftedness represent an advancement in the way that giftedness can be understood. Next, we outlined a systems approach to gifted education, based on the actiotope model of giftedness as its theoretical foundation. Finally, we argued that the systemic theory of gifted education represents a paradigm shift in the way we view the development of exceptionality.

Keywords: actiotope model of giftedness; systemic theory of gifted education; paradigm shift

1. Introduction

In our target article, we argue that current approaches to gifted education are largely ineffective (Ziegler & Phillipson, 2012). Based on systems theory in general and expertise studies in particular, we describe a systems approach to gifted education where the focus is on contextual organization of the components rather than one or more of the components per se. Because we base our approach on the actiotope model of giftedness (AMG) (Ziegler, 2005, in press), we describe our proposal as a paradigm shift in the way educators and researchers should think about exceptionality.

Our overarching aim is to change the way we implement gifted education. As we indicated in our article, our preference would be to do away altogether with the terms "gifted" and "talented." However, we understand that to implement change requires continued communication with policy-makers, practitioners, and researchers who are already working within the field. Our strategy is to redefine some of the terms within the systems approach.

The response by our colleagues has been overwhelming with the number of commentaries exceeding 40. Of these, the journal editors selected 27 that they felt

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represented a cross section of all responses. The authors thank all of our colleagues who spent the time in reading and then putting "fingers to keyboard." We are also grateful to be able to clarify points in our argument that could have been better expressed and to restate our position that systemic approaches to gifted education represent the best opportunity to meet the needs of our gifted students.

Of the 27 commentaries, three (Cheng, Harder, Yuen, & Fong) are known to be working within the paradigm. The remaining commentaries are authored by well-established educators and/or researchers in the broad field of gifted education. In terms of cultural origin, most of the commentaries are from East Asia (Hong Kong, China, and Singapore) ($n = 7$), followed by North America ($n = 6$), Australia ($n = 4$), and the Middle East ($n = 1$). Although it is foolish to draw any conclusions, it is interesting to note that societies based on Confucianism emphasize the strong relationship between culture and the development of learning (Chan, 2007; Phillipson, Stoeger, & Ziegler, in press).

We also note that many of the commentaries focus on the AMG itself rather than the systemic theory of giftedness. Given that any approach to gifted education should be based a sound theoretical framework, we are not surprised with such a focus. Indeed, we are grateful to be able to provide some answers to our critics. Although unable to respond to every point made by our commentators, we have tried to respond major points of contention as well as to those that would be of interest to a wider audience.

In responding to our commentaries, we begin by reviewing briefly the main points of our argument. We then organize our responses to the commentaries in the same order as these points.

2. Towards a systemic theory of gifted education

In support of our argument for a systemic theory of gifted education, we began by reviewing the research related to evaluations of current approaches to gifted education, making two points in relation to these studies: first, evaluation studies are likely to overestimate the effect sizes of gifted education programs given the propensity of journals to publish only positive findings, and that the placebo effects are usually unaccounted for. Second, gifted education programs show only, at best, moderate effect sizes. When journal bias and placebo effects are taken into account, the effect sizes of gifted education programs, such as acceleration, enrichment, and ability grouping, are very small.

Given that the purpose of gifted education is to make a difference to students, we offer a number of explanations for the ineffectiveness of current approaches to gifted education. At the heart of our argument is the view that gifted education is based on erroneous models of giftedness. These models are based on a mechanistic paradigm, where giftedness is essentially a limited number of personal traits that develop over time. When giftedness is a trait, the focus of teachers is to identify the markers, or traits, of giftedness such as high intelligence, creativity, and/or motivation, amongst others and how these traits are influenced by external factors such as friends, classrooms, and home environment, for example.

We do not doubt the existence of traits such as intelligence, creativity, and motivation. Each has a well-established theoretical basis and many important findings have emerged, including the strong correlation between intelligence and school

achievement (Strenze, 2007). However, school achievement, no matter how remarkable it may be, does not qualify as exceptionality. Rather, we argue that exceptional achievement is the outcome of a system.

The ineffectiveness of gifted education to achieve its desired outcomes is because it fails to consider the systemic nature of giftedness. Our article described briefly the AMG (Ziegler, 2005) as a systemic model of giftedness, including the concepts of action repertoire, subjective action space (SAS) and goals, and the environment.

Using the AMG as the theoretical basis of gifted education, we then go on to describe the basic principles of a systemic approach to gifted education as an alternative to most current approaches. The systemic approach emphasizes the interactions between the student and the environment and the coevolution of all the four components. We also emphasize the importance of harnessing actively the resources available to the student, constructing their learning pathway and encouraging the continuous interactions between the teacher, parent, and student.

3. Current state of gifted education

Our argument that current approaches to gifted education are ineffective is mostly unchallenged. Cohen, Dai, Perrson, and Sutherland make specific reference to the ineffectiveness of these approaches. In spite of the plethora of published works and ongoing interest in gifted education, Cohen, in particular, highlights the doubts of some of our foremost researchers regarding the efficacy of current approaches to gifted education and of the research protocols that aim to establish the effectiveness of these approaches.

On the other hand, Pérez and Beltrán and Schorer and Baker are cautious regarding our (and other researchers') conclusions regarding the ineffectiveness of current approaches to gifted education, suggesting that there is still insufficient evidence to justify a rejection of these approaches. Additionally, they contend that the criterion for success at both the program level and at the individual level is often not adequately defined. They point out that success means different things at different stages of the learning process, and that effect sizes are not necessarily relevant for practitioners of gifted education.

In agreement with Perrson, our explanation is that reports of small effect sizes are indicative of a fundamental misunderstanding of the nature of giftedness and how exceptionality develops. Indeed, trait models of giftedness focus on the identification of students with particular traits and then to provide these students with some sort of intervention such as curriculum modifications and/or grouping strategies. The outcomes of these strategies generally involve short time frames, and assume causal and linear relationships between two or more variables. Furthermore, effect sizes assume that the relationships are generally true for all members of a (gifted) group of students to ensure that the statistical tests have the necessary power to detect significant differences. Given the difficulty in meeting these requirements, it should not be surprising that reported effect sizes are generally small.

This concern over effect sizes is also relevant for a systemic approach to gifted education, particularly, when the same outcomes can be achieved through many pathways (equifinality), causal relationships are nonlinear and extend beyond the local system (interdependence and interconnectedness) and small changes in one variable can cause larger changes in other variables (phase transitions). As well as

explaining how exceptionality develops, these features of systems suggest that the focus of gifted education should be on the orientation of resources and on the construction of learning pathways at the level of the individual. These pathways depend on an understanding of the importance of individual goals and motivations, the best place for actions to develop (ecology), the need to replace existing actions and the steps needed to develop new actions, and the role of emotional and social stability. Accordingly, it may be more important to develop measures that show changes in place and the development of a learning pathway at an individual level. Hence, estimates of effect size are not relevant.

4. Gifted education and its basis on multifactorial models of giftedness

In this section, we discuss the commentaries that focus on the veracity of mulifactorial models of giftedness and their influence on current approaches to gifted education. These commentaries include Duan, Gagné, Gobet, Harder, Heller, Lee, Nolte, and Persson. Moreover, we discuss the challenges to our conclusion that these models are flawed.

Persson argues that current models of giftedness are limited because they reflect North American constructs. Furthermore, he suggests that models of giftedness should include both "evolutionary and socio-biological" perspectives. Although Persson does not elaborate on these terms, we have pointed out that the AMG is evolutionary in the sense that actiotopes evolve over the developmental process. Furthermore, we have outlined the five conditions necessary for the coevolution of all the four components of the actiotope, including goal validity, ecological validity, replacement validity, anticipatory validity, and learning pathways validity.

In terms of "socio-biology," several commentaries have noted that the AMG aligns with their understanding of how exceptionality develops within both the Australian aboriginal culture (Christie) and the Chinese culture (Tao & Shi; Pang; Yuen & Fong; Zhang & Liu). Our model is culture-fair in the sense that actiotopes are present in all cultures although details, of course, will differ.

Nolte recognizes that although many current models of giftedness include an environmental component, the AMG is unique in the way that the complex interdependencies are described.

Our conclusion that many current models of giftedness are flawed because of their reliance on mechanistic processes is disputed by several authors. Duan, for example, believes that we underestimate the importance of psychometric intelligence in the development of giftedness. To support his argument, Duan defines giftedness as high intelligence and cites several recent studies that substantiate the heritability of global brain volume, psychometric (*g*) intelligence, and the link between simple cognitive tasks and *g* intelligence.

Duan is correct in asserting that we do not pay much attention to psychometric intelligence. Although he considers heritability studies as important, we consider that it is more relevant to consider the link between psychometric intelligence and academic achievement. In a recent review of the extant literature, Strenze, (2007) concluded that intelligence is a "powerful predictor of educational, occupational, and financial success."

Lee maintains that the crucial role played by the environment has already been emphasized in a number of models of giftedness, such as Renzulli's expanded three-ring conception of giftedness, Tannenbaum's five component model, Sternberg's Wisdom Intelligence Creativity-Synthesized (WICS) Model, and Heller's Munich Model of Giftedness. However, we restate our point that the AMG describes the nature of the interactions between the components rather than their existence per se. Furthermore, we argue that the environment both changes and is changed by the the actiotope in ways that are not described by previous models of giftedness.

Similarly, Phillipson and Phillipson (2008) reported that up to 33% of the variability in the achievement scores in English language scores amongst Primary 5 and 6 students at one school in Hong Kong could be predicted by their score on the Ravens Progressive Matrices test. But this variability decreased to 9% and 33% for the subjects Chinese and Mathematics, respectively, indicating that the variability is subject dependant, thereby limiting the predictive value of psychometric intelligence.

More broadly, however, a focus on psychometric intelligence as a model of giftedness emphasizes the dependence on intelligence tests to identify gifted individuals. For schools, the decision to use intelligence tests is based on the need to balance the practical difficulties with their use, including high cost and interpretation of test scores, against its conceptual simplicity. In Hong Kong, for example, one of the difficulties in implementing its policy for gifted education is probably because of the high cost of using intelligence tests to identify its gifted students (Phillipson, Phillipson, & Eyre, 2011).

In agreeing that current models of giftedness are mechanistic, Gobet argues that such models can be useful to explain simple relationships. Hence, Gobet suggests that integrating mechanistic models with the AMG would lead to some useful findings. The key to this approach would be to carefully consider the different explanatory levels associated with each approach.

Several commentaries took exception to our claim that some current models of giftedness are mechanistic, including several models that take into account the interactions between the person and the environment (Gagné, Heller, & Lee). Although not disputing that the interactions between environment and the person are important, Heller maintains that there are more similarities than differences between the Sternberg's Triarchic Theory of Human Intelligence and WICS model or the Munich Dynamic Ability Achievement test. Indeed, Gagné thoughtfully argues that his Differentiated Model of Giftedness and Talent (DMGT) is not mechanistic and that its multicomponent nature takes into account all of the crucial interactions that we describe in the AMG.

Gagné concludes that there is an "underlying similarity" between the AMG and his DMGT, particularly in their descriptions of the components and their interactions. The fundamental difference between all of the conceptions of giftedness to date – including the DMGT – and the AMG is that exceptional achievement is the outcome of a system rather than an individual. This is not to trivialize the importance of the person, but to emphasize both the contextual nature of exceptional achievement and the nonlinear nature of the interactions between the components.

The other major difference is the origin of the giftedness: whereas, "gifts" are an important aspect of the DMGT, the AMG focuses on the outcomes of these gifts and their interactions with other components within a system. In agreement with Gagné, we consider "gifts", such as intelligence and sensory-motor aptitudes, as stable human characteristics and hence, do not change during the systems evolution. On the other hand, the outcomes of high intelligence would be a propensity to learn

more quickly, thereby placing pressures on different components of the system such as a rapidly expanding action repertoire and need to refocus goals.

We would like to also respond to Gagné's charge that our use of the terms gifted and talented is "bizarre." As previously mentioned in our response, we would prefer to do away with the terms altogether; a point that Sutherland also agrees. However, we took a compromise position and tried to define the terms within a developmental pathway in much the same way that Gagné would have done when first outlining the DMGT.

Of the two terms, the most important is "gifted", since it coincides with the point in the pathway when all of the conditions are in place for exceptionality to be realized. In other words, a person is gifted when their action repertoire is sufficiently well developed and the only thing missing is that final opportunity or "problem" that tips the person into demonstrating an exceptional outcome.

A person is "talented" when their action repertoire is significantly beyond that of their immediate peers. Hence, the term describes a general condition that is easily recognized but, again, is defined by the local environment. When the environment changes, the action repertoire is recalibrated.[1]

In support of the systems theory of gifted education, Harder believes that the AMG provides a practical framework for implementing a counseling strategy that supports the development of an individualized learning pathway. The framework is useful because it describes how the person interacts with the environment.

A number of authors make useful suggestions to the AMG itself. At a fundamental level, Cheng challenges us to explain better the concepts within the AMG and to test the validity of the model before implementing or using it as the basis for an approach to gifted education. Importantly, Cheng suggests that the SAS needs to take account of the different goal types, differentiating between performance-oriented SAS and mastery-oriented SAS.

Cheng's suggestions are reasonable. If the systemic theory of gifted education is to gain wide acceptance, then we must be prepared to explain our concepts in ways that both researchers and practitioners can understand. On the other hand, testing the validity of the AMG is much more difficult to achieve. At one level, we can argue that if an implementation of the systemic theory of gifted education is successful, it is because our conceptual basis is valid. It is much more important, however, to use the heuristic value of the model itself to test its validity.

As a number of authors have pointed out, the inherent nature of systems make this a more difficult task. Some of these difficulties are discussed later in this article. However, we are pleased to report that the validity of the AMG is beginning to be tested (Phillipson, 2012). For example, Harder (2012) has used structural equation modeling to test a number of hypotheses arising out of the AMG. Furthermore, Duan and Arora (2012) and Kist (2012) have used the AMG as the conceptual framework for studies involving gender and cross-cultural differences in the STEM subjects and predicators of success in second language instruction, respectively.

As Gobet explained, systems models are usually expressed in mathematical terms and our challenge is to describe the AMG in sufficient detail to allow its empirical testing. Significantly, both Harder (2012) and Phillipson (2012) concluded, new methods of data modeling need to be introduced in order to test the validity of the AMG.

5. Systems approaches to gifted education

The many comments referring to the systems perspective of gifted education fall into two broad groups. The first generally support this perspective, noting its timeliness and similarity with other systems theories and making suggestions to refine it (Garces-Bacsal; Gobet; Grigorenko; Harder; Heller; Lee; Nolter; Pérez & Beltrán; Persson; Schorer & Baker; Sutherland; Tao & Shi; Woolcott; Yuen & Fong; Zhang & Liu; Zhang, Chen & Shi).

In the second group, Johnson and Stefurak disagree with us that the interactions between the four components constitute a system. Moreover, they propose that gifted education should be based on multiple paradigms, including a practice-based research paradigm.

Schulz argues that the theory we present is not a system because we fall into the "bind" of describing the "parts … that lead to the whole" and challenges us to provide a stronger justification for our claim.

Finally, Sarouphim maintains that the longevity and popularity of models of giftedness, such as Renzulli's school-wide enrichment model and June Maker's DISCOVER model and Gardner's multiple intelligences, prove their validity and effectiveness.

We would like to respond to some of these points in more detail.

5.1. Responses generally positive to the systemic theory of gifted education

Garces-Bacsal and Nolte are generally positive about our proposal for a systemic theory of gifted education, but remind us that both Bronfenbrenner and Vygotsky have already described human development in terms of the social context. In particular, Bronfenbrenner's bioecological systems theory focuses on the factors that directly and indirectly influence the developing child. Of course, Bronfenbrenner's ideas parallel Vygotsky's social constructivist theories.

Other responses point out that our theory is consistent with both current ideas in cognitive and neurosciences (Woolcott) and experiences in the Chinese (Confucian) context (Pang; Tao & Shi; Yuen & Fong; Zhang & Liu; Zhang; Chan & Shi).

In pursuing a theory using a systems perspective, we expect to echo some of the important discussion in related domains. It is important to bear in mind, however, that both Bronfenbrenner and Vysgotsky were concerned with general principles of development rather than exceptionality. Nevertheless, we consider that complementary ideas lend support to our specific theory. Furthermore, a system that describes exceptionality is only part of a larger and more intricate (and perhaps infinite) system.

Our system is, of course, a gross oversimplification. As Gobet, Persson, and Tao and Shi point out, systems by definition imply complexity. Hence, a study of systems requires a trade off between over simplification, in order to be amenable to study as well as being practical, and missing something important. Along these lines, Schorer and Baker question the feasibility of the systemic approach and ask what are the criteria and benchmarks for success, given our criticisms of current approaches to gifted education.

At the basic level, our response is that success is measured at the individual level. In other words, success is determined when the sociotope is geared toward and values learning, when the goals have been clearly identified and the SAS is not

limiting. The action repertoire should develop accordingly, making it necessary to re-examine the environment, goals, and SAS. To date, rudimentary attempts have been made to develop inventories that measure these components (Harder, 2012; Ziegler, 2008).

Grigorenko is also positive about our efforts " … to bring the field to a new level," pointing out that our approach focuses on the conditions that allow the emergence of exceptionality and less on the "who." Her suggestion is to add the concept of perturbation to the theory so as to take into account the possibility that the system reshuffles itself in response to random fluctuations in the environment, for example. Grigorenko provides a number of cases to illustrate how perturbations have occurred to the systems of some noted individuals.

Although we do not use the term perturbation, we considered the potential for the system to undergo a change in phase. We use an example where a small (measurable) increase in a student's interest in a "technical field" might be sufficient to change his career choice from medicine to engineering. We would consider this a perturbation within the student although, as Grigorenko illustrated, perturbations can occur in the person's environment.

5.2. *Responses critical of the systemic theory of gifted education*

Perez and Beltran argue that the theory focused too heavily on the system and not enough on the individual. On the other hand, Sarouphim is suspicious that despite its value in emphasizing "change" and "modifiability," our ideas have already been outlined by others, including Bandura and Cronbach. Furthermore, Sarouphin believes that well-established practice of designing and implementing individual instruction plans renders the systemic theory of gifted education redundant.

Many responses focused on the impractical nature of the theory, arguing that it is too difficult to study and understand (Persson; Sarouphim; Sutherland; Tao & Shi). Sarouphim opines that our systems perspective may be too difficult for practitioners to understand and implement. Since communication in essential, we will endeavor to make clearer our ideas in future publications.

On the other hand, the similarity between our approach to gifted education and the design and implementation of individualized instruction plans is true. Our individualized approach to gifted education is based on the AMG.

6. The systemic theory of gifted education as a paradigm shift

Three authors challenged our claim that the theory represented a paradigm shift, including Cohen, Gagné, and Schulz. To defend our claim, we draw on our understanding of the nature of scientific paradigms as expressed in Chalmers (1994) and Lakatos (1974).

In order for any scientific theory to direct research, the theory must have an internal structure (Lakatos, 1974). The first of the four components forms the *hard core* of the structure, containing the basic assumptions, knowledge, terminology, and experimental paradigms that are implicitly agreed upon by the scientists working with the theory.

By definition, the *hard core* is unchangeable. According to Chalmers (1994), however, it is often difficult for a scientist to articulate the precise nature of the paradigm within which they are working unless the paradigm is seriously questioned.

The issue is confounded if a number of different theories share a common term or label to describe key elements in their *hard core*. The scientists using the AMG as the theoretical framework have agreed, implicitly or otherwise, on the contents of the hard core.

There are five criteria that a new theory must satisfy if it is to replace a previously accepted theory (Chalmers, 1994):

(1) Although a previously accepted theory provides an acceptable explanation of a phenomenon, the new theory must give the same results.
(2) The new theory should explain something that the previously accepted theory either got wrong or, more commonly, did not apply.
(3) The new theory makes a prediction that is later verified.
(4) The new theory is elegant or has an aesthetic quality that exudes simplicity, power, and universal symmetries.
(5) The new theory provide a deeper insight or link to another branch of knowledge.

Our systemic theory of gifted education has the AMG as its theoretical basis. We represented our argument as a paradigm shift in gifted education because of the focus on a system rather than individual. We outlined a set of facts and assumptions that described the hard core of our model (Chalmers, 1994; Lakatos, 1974). Because this hard core differs from those of other models of giftedness, we considered it to represent a paradigm shift.

Whether or not the new paradigm will catch on with a wider audience is as yet unknown. As many authors conceded, a good idea may not be sufficient to make a change in a field that has many vested interests.

7. Conclusion

Our target article challenged the way we think about gifted education and, we hope, change the way we implement gifted education. To paraphrase from our article, the AMG offers an improvement to our understanding of the complexity of the phenomenon known as exceptionality. A systems approach to gifted education, with the AMG as its theoretical basis, focuses on the educational environment and the individual. In optimizing the opportunities for exceptionality to develop, practitioners need to only understand that all the four components interact in some way, although the outcomes are not always predictable. Although we have outlined the model as a system, practitioners need not be concerned with the details of how systems work: after all, they and their students have been working as a part of system all along often without realizing it.

Acknowledgment

Once again, we thank our colleagues for their responses to our article.

Note

1. This point is best illustrated with a personal vignette. One of us (SNP) recently relocated his family from Hong Kong to Melbourne, necessitating a new school for our son. According to the standards of his school in Hong Kong, his academic achievements

were considered average. In Melbourne, however, he is considered to be outstanding according to the academic standards of his new school. Clearly, the sudden change in environment means that his action repertoire has been recalibrated rather than suddenly expanded.

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Trends in education excellence gaps: a 12-year international perspective via the multilevel model for change

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A recent study in the USA documented the existence and growth of "excellence gaps" among students. These gaps are similar to the minimum competency achievement gaps that proliferate in policy discussions in many Western countries, but excellence gaps focus on the highest level of achievement rather than minimum competency. We extend this research using an international approach, data from the most recent Trends in International Mathematics and Science Study, and a multilevel model for change to examine excellence gap trends with specific emphasis on sex and immigrant status of the student. At an international level, sex-based findings are encouraging. Specifically, we found evidence of shrinking sex-based excellence gaps in both science and mathematics. With respect to immigrant status and excellence gaps, small gaps in the proportion of advanced achievers persist over time. In the context of large demographic changes worldwide, we argue that these findings are generally encouraging.

Keywords: achievement; gaps; TIMSS; excellence; growth modeling; trends

Introduction

The most able students in vulnerable groups tend to underachieve, whether those groups include students in poverty or of low socioeconomic status, belonging to specific racial, ethnic, or immigrant groups that have historically been disadvantaged, or based on sex or certain categories of physical or learning disabilities, among others. Often using the rhetoric of globalization and global competitioneducational reforms in many countries are aimed at narrowing achievement gaps between important demographic groups. For example, the No Child Left Behind Act in the USA places a focus on minimum competency with the goal of raising achievement for the lowest performers to a basic level of educational achievement, thereby shrinking gaps in achievement. Other countries have used the Organisation for Economic Co-operation and Development's (OECD's) Programme for International Student Assessment (PISA) results to enact similar changes. For example, findings from PISA 2000, which ranked Germany's school system 21st out of 32 participating OECD countries (OECD, 2001), were used to vigorously challenge the highly tracked German secondary education system. Specifically, PISA findings indicated that students in general and vocational tracks were far behind their academically

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