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A Bull's Eye on My Back: The Perils and Pitfalls of Trying to Bring About Educational Change

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Judge not, that ye be not judged. For with what judgment ye judge, ye shall be judged: and with what measure ye mete, it shall be meted to you again. (Matthew 7:1, 2)

Abstract

This article consists of a step by step refutation of criticisms made by Dr. Hans Jellen in a presentation entitled "Renzulli-it-is: A national disease in gifted education" delivered at the Illinois State Conference on the Gifted, on 14th November 1983. The three-ring conception of giftedness (abilities, creativity, and task orientation) is justified and supporting research is quoted. The Student Product Assessment Form (SPAF) is defended and compared to Jellen's unadopted S1U 0-100 Approach, and the widely adopted Enrichment Triad Model for developing programmes for the gifted is compared to Jellen's entirely untried "more-of-the-same" approach.

One of the realities of trying to bring about any type of educational change is that you become a target for all manner of criticism. If your work is popular and practical there will undoubtedly be exhortations about the need for more and better research. And if your work happens to be popular, practical, and research based, then someone is bound to say that it lacks theoretical substance. It's like having a bull's eye on your back in a forest full of trigger-happy hunters.

For the past couple of years Mr. Jellen has been engaged in a crusade to discredit my work. Presentations and articles (unpublished) branding my work a "national disease in gifted education" (Jellen, 1983) have certainly given me reason for concern, and therefore I am most pleased to have this opportunity to respond to the preceding article. Rather than attempting to defend the theory and research underlying my work, which is well documented in a variety of places (Cooper, 1983; Gubbins, 1982; Reis, 1981; Reis & Cellerino, 1983; Reis & Renzulli, 1982; Renzulli, 1977, 1978, 1982a, 1983, 1984; Renzulli, Reis, & Smith, 1981; Renzulli, Smith, & Reis, 1982) my approach will be to analyze the bizarre nature of his criticism, and to examine the implications for

programming that might result if anyone is inclined to take Mr. Jellen's suggestions seriously. In the process, and following the biblical advice offered above, I will attempt to point out why I believe his so called "objective examination" of my work is little more than an illogical and contradictory exercise in the writing of educational drivel! Before going on to my own analysis, however, it is necessary to provide a little background about Mr. Jellen's interaction with my work and my reasons for reaching such strong conclusions about his criticism of it.

When I first learned about Mr. Jellen's interest in my work, and especially the allegation that I was guilty of spreading a "national disease," I thought it best to enter into dialogue with him. My hope was that my own efforts might be improved by having the benefit of a critical analysis prepared by someone who fancies himself a theorist, and who at the same time, has not made any major contributions to the literature on the gifted and talented. Such outside opinions are potentially valuable because they bring to the field a different perspective that might result in new insights.

My first attempt to enter into dialogue with Mr. Jellen was a written request for a copy of his "national disease" paper, but he declined to share it with me. This reaction was quite surprising, since Mr. Jellen and I are not only graduates of the same university, but also completed our doctoral studies under the direction of the same advisor. And if there is one thing I know our former mentor stands for, it is an open and honest dialogue among persons who are dealing with theoretical aspects of the same issue. Although I was disappointed that Mr. Jellen would not share his paper with me, I was nevertheless undaunted in learning more about his criticism as quickly as possible, lest the disease he accuses me of spreading gallops rampant and unchecked throughout the gifted programs that are based on various aspects of my work. I next reviewed the *Education Index* in the hope of at least finding *something* that might give me a hint about his position and a possible antidote for the disease that he accuses me of perpetrating upon the field. But alas, I could not find a single article, book or abstract. I next checked the *Social Science Citation Index*, but once again could not find reference to any research papers, theoretical statements about his beliefs, or anything he had written. You can imagine my frustration! A dangerous plague might be spreading unchecked and unabated across the field, and this self-proclaimed savior had not conducted a single research study or written a single theoretical paper that might save us from annihilation. In my search I did discover that he had co-authored a paper on ways to motivate gifted students (Magoon & Jellen, 1978); and this discovery was curiously fascinating because it appears to support some of the very same approaches that Mr. Jellen so vociferously criticizes about my work. Indeed, he calls my model "nothing but a motivational device," and yet his only published article deals almost exclusively with a way to motivate gifted students.

At the height of my frustration and concern a ray of hope appeared in the form of an audio tape of Mr. Jellen's "national disease" presentation. Although I listened to the tape several times, I could not seem to make any sense of his presentation. By this time my anxiety was at its zenith. In a last desperate effort to learn something (anything!) about the position of this person who was lecturing on the "atheoretical" and "self-

defeating" nature of my work, I examined a copy of Mr. Jellen's unpublished doctoral dissertation (1981). You can imagine my surprise when I discovered that he had done no research, he had written no theory, he had not investigated the nature or effectiveness of any programs that serve gifted students. Rather, his work consisted of a glossary of terms about the field of the gifted. In the discussion that follows I will make reference to some of the terms included in this "glossary," and attempt to point out certain discrepancies about Jellen's definitions and the position he takes in the preceding article.

The Broadened Conception of Giftedness

Mr. Jellen begins his argument against my three-ring conception of giftedness by stating that "few knowledgeable psychologists would argue against a broadening of the construct of giftedness." He then goes on to criticize my efforts to expand the concept of giftedness and, in so doing, he completely ignores the vast amount of research that clearly and unequivocally points out the role played by factors other than traditionally measured intelligence. Rather, he reverts to the argument that individualized IQ tests and the *g* factor are the "predominant criterion" for identifying gifted individuals and further makes the nothing short of preposterous statement that such measures of intelligence are culturally fair! Even Terman warned us against total reliance upon such tests when he stated: "We must guard against defining intelligence solely in terms of the ability to pass the tests of a given intelligence scale" (1921, p. 131). E. L. Thorndike echoed Terman's concern by stating:

> … to assume that we have measured some general power which resides in [the person being tested] and determines his ability in every variety of intellectual tasks in its entirety is to fly directly in the face of all that is known about the organization of the intellect (Thorndike, 1921, p. 126).

Another researcher who re-evaluated her original definition of giftedness with the passing of time was Hollingworth. Her early work was concerned solely with research using the top 1 percent of the juvenile population in general intelligence; however, the results of her research led to the following statement:

> … by a gifted child, we mean one that is far more educable than the generality of children are. This greater educability may lie along the lines of arts, as in music or drawing; it may lie in the sphere of mechanical aptitude; or it may consist in surpassing power to achieve literary and abstract intelligence. It is the business of education to consider all forms of giftedness in pupils in reference to how unusual individuals may be trained for their own welfare and that of society at large. (Hollingworth, 1931; cited in Pritchard, 1951, p. 81).

The more recent work of Sternberg (1981, 1982, 1984) and Gardner (1983, 1984) further substantiate the role played by other factors in the manifestation of intelligent behavior. The works of these authors, which have been recognized as nothing short of modern day classics in the study of human abilities, point out time and

time again that no single test can ever begin to assess the full range of human intelligence, let alone other abilities that are important determinants of accomplishment. To quote Sternberg:

> ... I.Q. tests do not predict real-world performance well (much less explain it) ... Educators have long searched for a panacea in their attempts to provide high quality education for all. Tests—old or new—will never be that panacea (Sternberg, 1984, p. 689).

Gardner goes so far as to say that we cannot justify "the enormous and often destructive role [that tests] have come to play in societies all over the world" (Gardner, 1984, p. 700). If Mr. Jellen chooses to ignore totally these research-based contributions to the literature, I can only conclude that he also chooses to disqualify himself from the group of "knowledgeable psychologists" to whom he makes reference in his article.

Jellen states that my approach to giftedness will leave us with a "potpourri of 'gifted' students who do not have in common an underpinning of above average intelligence or *g*." If this is the case, why then is the concept of above average intelligence included as one of the three major dimensions of my definition? If I did not believe that traditionally measured abilities play an important role, but not the *only* role, I certainly would not have devoted a major portion of my research to examining the influence of such abilities in the development of gifted behaviors. Two points need to be made about concern for above average though not necessarily superior ability. First, the concept of ability is not restricted to measured intelligence. We need only examine the above quotations by Terman, Hollingworth, Thorndike, Sternberg and Gardner to realize that even intelligence is a broader concept than Jellen would lead us to believe with his emphasis on the *g* factor and the "IQ-metric." We must broaden the concept of ability if we are going to broaden the concept of giftedness (as Mr. Jellen points out in his "few knowledgeable psychologists" statement). Second, when Mr. Jellen says that I fail to define psychometrically the meaning of this concept, my first thought is that he is still in search of a magic IQ cut-off score. This is especially interesting since in his "glossary" he includes even physical acts under the definition of ability.

There is an important reason why I have not specified a percentile or cut-off point in the definition of above average ability. Because giftedness (or the display of gifted behaviors, which is my preferred way of dealing with the concept) is an *interactive* concept that draws upon the application of a variety of traits at different times and under different circumstances, it is literally impossible to set a fixed cut-off point that will determine in an absolute (and magical!) fashion that a person is "gifted" or "not gifted." This is the kind of educational nonsense that has caused the gifted child movement to be viewed with suspicion if not mirth by serious scholars. We must also keep in mind that many abilities cannot be measured in the precise psychometric fashion which Mr. Jellen claims to be the *sine qua non* of giftedness. Once again, this fact has been established by numerous research studies. If the best known theorists and researchers have judiciously avoided setting such a cut-off point, I question whether or not Mr. Jellen's armchair analysis can provide us with the magic cut-off score. If this were the

case, I expect he would have reported such a score in his article! In a similar fashion, Mr. Jellen repeatedly uses the term "IQ-metric," but never explains what is meant by this term. (It is also absent from his "glossary.") If we infer that it means a measured intelligence quotient, then I would once again like to learn specifically at what level Mr. Jellen believes a person should achieve a measured intelligence score in order to be classified as "gifted."

The Time-Worn Creativity Question

One of the issues that Mr. Jellen deals with is the time-worn question of whether creativity is separate from, or an inter-related part of intelligence. This issue, like the heredity/environment issue, is a topic about which psychologists have debated for years and will undoubtedly continue to debate for decades if not centuries to come. In many ways the crux of the issue boils down to how one defines the two concepts (i.e., intelligence and creativity) and how one chooses to explain the correlations that have resulted from numerous studies comparing these two psychological constructs (e.g., Wallach & Wing, 1969; McNemar, 1964; Thorndike, 1963). Indeed, it is precisely because this is a "moot" point in the study and interpretation of human behavior that I routinely assign this topic as an introductory paper for persons enrolled in my graduate program at the University of Connecticut.

Mr. Jellen incorrectly criticizes my separation of creativity from *g* (actually, I have separated it from Above Average Ability, but mainly for analytic reasons), and goes on to say that there is no psychometrically sound means to measure this "dubious term." It is interesting to note that he has included the "dubious" term in his "glossary" and seems to have ignored a vast body of psychometric literature that points out the existence of the psychologically identifiable construct of creativity. He also ignores the several approaches (both objective and subjective) that have been used to measure it (Guilford, 1967; Torrance, 1972; Vernon, 1967; Wodtke, 1964). I do not object to his interest in engaging in polemics about whether or not creativity is a part of, or separate from intelligence, but he misses the main point of my three-ring conception of giftedness. Since it seems quite unlikely that persons with opposing points of view and various interpretations of empirical studies will ever reach consensus about this issue, I have chosen to deal with the issue in a much more theoretically sound and yet practical manner. The emphasis of my three-ring conception of giftedness is that creative productivity or gifted behaviors result from an *interaction* of abilities, creativity, and task commitment. This position is not only supported by vast amounts of research, but it also provides us with an operational definition on which subsequent identification and programming decisions can be based. This avoids having to engage in non-productive arguments about an issue that will probably never be resolved to everyone's total satisfaction. For the past 18 years my efforts have been directed toward developing and studying a wide variety of defensible services for high potential young people that are based on the best theory and research that are currently available. I don't mind debating the creativity/intelligence distinction with my graduate students and colleagues, but let us not use this unresolved controversy to defer taking positive steps toward translating theory into practice. The three-ring conception of giftedness presents a theoretically

sound and research supported description of a psychological phenomenon. My own preference is to put this information to work toward useful ends for bright youngsters rather than playing seminar games.

The Student Product Assessment Form

Mr. Jellen incorrectly states that I have offered the *Student Product Assessment Form (SPAF)* as a measure of creativity, and he criticizes its use by "teachers with little or no insight in knowledge production…" He dwells on a largely irrelevant issue about the publisher of the instrument, without paying any attention whatsoever to the highly scientific procedures that were used to establish the reliability and validity of SPAF. This is curiously fascinating because in his own work (Magoon & Jellen, 1978) he offers a completely unsubstantiated approach to programming for gifted students and provides not one ounce of psychometric data to substantiate this approach. The *Student Product Assessment Form* was developed and validated through both standard and respected instrument development procedures. The procedures have been reported in the literature (Reis, 1981) and are available for all the world to see. If Mr. Jellen criticizes the nature or use of this instrument, it seems reasonable to expect him to provide at least a modicum of data about the method that he recommends in his SIU 0-100 Approach. In recent surveys of gifted programs in both the United States and Canada (Mitchell, 1982; Speed, 1984) I note that not a single program makes use of the SIU 0-100 Approach. Perhaps the absence of research data on Mr. Jellen's part might help to explain why his unsubstantiated approach has not gained any educational acceptance.

After criticizing the role that creativity plays in the development of gifted behaviors, and raising questions about the measurement of creativity, Mr. Jellen goes on to make a case for including the concepts of altruism and functional empathy in the construct of giftedness. Although I have no argument with the inclusion of these concepts in descriptions of gifted behaviors, let us apply Mr. Jellen's own standards to such a proposal. Where is the research (not rhetoric) that substantiates the role that these concepts play in the production of gifted behaviors? And where are the measuring instruments that Mr. Jellen seems to feel are necessary before we can discuss a psychological construct? He can't have it both ways! In other words, he can't dwell on how defensible "metrics" are and how indefensible creativity is on one hand, and on the other tell us that we should now include altruism and functional empathy in our definition and identification of gifted individuals.

Task Commitment

Mr. Jellen criticizes my use of the concept of task commitment because it is "absent in the psychological literature, and therefore lacks definitional clarity and psychometric backing" (a logical non sequitur). [I don't know whether or not I was the first person to use this term, but I might mention that other terms such as ego and intelligence quotient were not in the literature until Freud and Stern first made use of them.] I also might add that in Mr. Jellen's "glossary" he not only uses the term "task commitment," but lists it under the concept of giftedness. But this is not the point! When Jellen tells us that the

concept of task commitment lacks conceptual clarity and psychometric validity he is once again totally ignoring the nothing short of classic studies that have been carried out on gifted and talented individuals. Even the work of Terman, which in its early years focused largely on the high IQ conception of giftedness, was careful to point out other important factors that account for the display of gifted behaviors. According to Terman:

> … a detailed analysis was made of the 150 most successful and 150 least successful men among the gifted subjects in an attempt to identify some of the non-intellectual factors that affect life success … Since the less successful subjects do not differ to any extent in intelligence as measured by tests, it is clear that notable achievement calls for more than a high order of intelligence.
>
> The results [of the follow-up] indicated that personality factors are extremely important determiners of achievement … The four traits on which [the most and least successful groups] differed most widely were *persistence in the accomplishment of ends, integration toward goals, self-confidence, and freedom from inferiority feelings.* In the total picture the greatest contrast between the two groups was in all-round emotional and social adjustment, and in drive to achieve. (Terman & Oden, 1959, p. 148, italics not in the original.)

If the above mentioned traits (quoted in my own work) are not examples of task commitment, I fail to understand what criteria Mr. Jellen uses for "conceptual clarity and psychometric validity."

Mr. Jellen ends his section on "A Case for and Against Renzulli's Broadened Conception of Giftedness" by stating that "the highly gifted from all walks of life are frequently missing from the very programs that were designed for them." I wonder if he wouldn't mind devoting just a sentence or two to telling us in precise and specific terms exactly who he is talking about when he uses a term such as the "highly gifted," and exactly how he might go about identifying them! In an article that I wrote a few years ago ("Dear Mr. and Mrs. Copernicus: We regret to inform you …" Renzulli, 1982b) I listed a distinguished group of world famous individuals (studied by Terman and his colleagues) who would have been eliminated from a present day gifted program if we set an IQ cut-off score at 125, but who would be included in the Talent Pool we recommended.

Some Thoughts About Programming

After criticizing my conception of giftedness, Mr. Jellen goes on to make several points about the "theoretical shortcomings" of my programming model. His first point is a summary of previously discussed material that is as vague and illusive as his interpretation of the three-ring conception of giftedness. His second point introduces two equally vague and undocumented concepts (*educare* and *educere*—not included in his "glossary"); and I must be quite honest in saying that I do not understand what this gibberish is all about. What is he arguing against? Should we ignore student interest in special programs and should we avoid developing motivation in our most able learners?

Should we substitute more “curricular matter” at the expense of methodological procedures and processes for dealing with substance or content? Perhaps it might be worthwhile to remind Mr. Jellen that gifted individuals have been recognized throughout the course of history because (1) they *developed* highly specialized and in some cases even obsessive interests in particular topics, (2) they *developed* the motivation or task commitment to struggle with these topics over long periods of time and sometimes under adverse conditions, and (3) they *developed* the methodological skills to contribute new knowledge to their chosen fields of endeavor.

Mr. Jellen talks about knowledge production while simultaneously telling us that a program for the gifted should focus on “normative general education.” History and civilization do not remember those persons who merely acquired high levels of existing knowledge. Rather, the persons who have been designated as the most “gifted” contributors to the arts and sciences and to leadership in the development of civilization have always been persons who have gone *beyond* existing knowledge, the *status quo*, and present ways of doing things. If these are the persons that our culture has seen fit to designate as gifted individuals, then does it not make good sense to develop a programming model that uses the *modus operandi* of these individuals as a paradigm for educating high potential youth rather than the *modus operandi* of the lesson learner? This is not to say that advanced level content learning should not be an important part of any program for youngsters who can deal with advanced material. But the point is that acquisition of content has little value in the production of gifted behaviors (with the possible exception of memorization) until methodological processes are brought to bear upon such content.

General Education and Specialized Enrichment Experiences

Mr. Jellen misrepresents my point of view by implying that I would offer *any* type of enrichment experience as a substitute for the highest quality general education that can be provided for our most able learners. Following Ward’s (1980) principles, I believe that the “regular” education of highly able youth “should be characterized by a pace and level of complexity which are best suited to their broadened capabilities” (p. 129); that the “scope and content should extend into the general nature of all the chief branches of knowledge,” (p. 144) and “that programs for highly able youth should emphasize enduring methods and sources of learning, as opposed to a terminal emphasis upon present states of knowledge” (p. 156). The reason that I refer to these principles as guidelines for the regular education of superior learners is that it is difficult to argue against the fact that these are the essential approaches that should be taken into account in any advanced course or learning experience for bright youngsters. My model, on the other hand, has attempted to organize a learning environment whereby highly able youth are given the opportunity and encouragement to go beyond the uncontested principles that recommend advanced lesson learning. My concern and emphasis is that if a program does not provide some type of vehicle for the application of knowledge to real problem situations, and the opportunity to pursue self-selected topics and areas of interest to a far greater depth and level than one’s uninterested peers, then the program remains essentially didactic in nature and fails to take into

consideration the most minimal respect for the principle of individual differences. We must keep in mind that the range of abilities and interests within any specially identified population are as broad as differences between this group and the population at large. Mr. Jellen simply doesn't understand what he is implying when he talks about "the fundamentally normative aspect of a sound general education." The term, norm, is defined as "an authorative standard," and fortunately or unfortunately as the case may be, this is what most of the education of young people is all about, from primary grades through graduate school. Mr. Jellen's very dangerous implication is that we should apply this "more-of-the-same" approach to programming models that serve highly able youth.

In my article dealing with "What Makes a Problem Real: Stalking the Elusive Meaning of Qualitative Differences in Gifted Education" (Renzulli, 1982a), I have attempted to analyze the difference between Jellen's rather simplified view of "normative general education" for the gifted and my recommended approach by comparing the two approaches on each of four variables: the role of the student, the role of knowledge (content), the role of process, and the role of the teacher. It is interesting to note that Mr. Jellen has not considered this analysis in his critique of my work, nor does he deal with the important difference between advanced level didacticism and the nature of real inquiry. Evidence of Jellen's confusion is highlighted by his discussion of Phenix's model in which he simply converts Phenix's *general* curricular suggestions into a proposed model for gifted students. Whether or not one agrees with Phenix's work (I strongly support it) is not the issue here. Rather, the issue is that Mr. Jellen confuses the principles of a sound general education (adjusted, of course, for different levels of ability among learners) with a model for gifted education.

The height of Mr. Jellen's misunderstanding of my work is embodied in his statement, "The gifted learner is encouraged to utilize and to produce knowledge; he/she learns how to learn." What does he think that the Type III Enrichment dimension of my model is all about? And how can a person be encouraged to utilize and produce knowledge if the focus is on an advanced level *normative* education? He criticizes my work by saying that "student products are student interest based and lack, therefore the curricular foundations of articulation of knowledge on the whole and qualitative differentiation concerning generative content within each of the six curricular areas outlined earlier" (another logical non sequitur—and more gibberish). Is he therefore implying that students should attempt to produce knowledge in areas in which they do not have an interest? If we look at the list of luminaries that he invokes (DaVinci, Shakespeare, Jefferson, etc.) it is easy to understand why a model that emphasizes knowledge production, utilization, and application is a much more appropriate paradigm for the education of our most able youth than the normative model suggested by Jellen. Programs based on my model have resulted in an almost endless proliferation of outstanding examples of leadership, the production of original knowledge, the solution of locally important social or political problems, and an almost limitless number of highly creative products. Numerous research and evaluation studies and descriptive articles have documented these examples of productivity. It would be most gratifying if Mr. Jellen could report to us even a single instance or piece of data that supports the normative approach he seems to be recommending. While I agree that the studies of

acceleration carried out by Stanley and his colleagues (1974) tell us how high scores predict success in advanced lesson learning situations, these studies have not reported examples of creative productivity or the application of advanced learning to real world problems.

Mr. Jellen's Non-Conclusions

Jellen ends his article with the usual kinds of shibboleths and glittering generalities about socio-philosophical perspective, ethical considerations, democracy, social ostracism, bribes, and other catch words that are undoubtedly designed to lead us to believe that his vague suggestions will overcome these and all the other problems of the world. I am surprised he didn't throw in the usual admonition about the need for more and better research! (At least once every year or so, one of these articles appears in the literature—invariably written by a person who never does any research.) He talks about "the training of the will," without the slightest suggestion about how such training might take place, and then once again reaffirms his position about my work being "nothing but a motivational device." How does he propose that we train the will? With*out* motivation? By *not* allowing gifted students to develop strong interests in specialized areas of knowledge and research? As I reread Jellen's conclusions my only conclusion is that he has engaged in an unverified exercise in educational drivel. The dictionary defines drivel as "foolish talk, senseless utterance, and twaddle!" If this is the level of his contribution I will leave it to the reader to judge whether or not his arrow has struck the bull's eye or sailed wide of the mark.

I would like to end by reaffirming my earlier statement about the need for critical analysis of my work or the work of any other person who presumes to offer the education public a plan for serving highly able youth. For better or worse, my ideas and the research that has been carried out to verify these ideas has been published for public consumption and it is therefore open to the criticism and attack of anyone who would like to engage in the process of critical analysis. This is the way that it should be; and over the years I have repeatedly invited such criticism. I would, however, like to offer a small amount of advice to persons who would like to engage in such analysis.

Programs based on my ideas and the ideas of my colleagues can be found in numerous school districts throughout the United States and Canada as well as a number of other places throughout the world. From small schools on the Great Plains of Iowa to large metropolitan districts such as Toronto and New York City, numerous and varied applications of my work are available for an almost infinite variety of research and evaluation studies. If there is anything I am proud of at this point in time, it is that my colleagues and I have carried out and reported validation studies on all aspects of our work. We have taken the time to gather the data, to evaluate the findings, and to introduce modifications when there was clear evidence that such modifications were necessary. But there is still a need for independent cross-validation research as well as research that relates to special populations and unique adaptations of the Triad and Revolving Door Models. I invite such research and will willingly share a list of the locations where such research opportunities might be initiated. It is only through these

kinds of research and evaluation activities that we will ever achieve new insights and come up with better ways of serving highly able youth. The kinds of armchair analysis or the "cheap shots" that are offered by persons who are unwilling to engage in legitimate scholarly activities only tend to retard rather than advance the international cause of education for our most potentially gifted and talented young people. Our field is replete with journalism (rather than research) about all manner of unverified teaching, counseling, and identification practices. Is it any wonder that scholars from other disciplines view many of the books and articles about the gifted as "cute" or naive?

It is my sincere hope that in the years ahead new and better models will emerge for serving highly able youth. There is an old saying in the philosophy of science that the accepted theories of today will be tomorrow's outmoded ideas. Just as Einstein's work largely disproved many of Newton's "laws" of physics, so also do I accept the fact that new and better models will someday replace my work and the work of others that is currently popular. But these advances in the state of our art and science will not take place unless critics are willing to engage in the difficult and demanding process of applying first rate science and scholarship to the important tasks before us.

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