Renzulli, J. S. (2016). Freedom to teach: Using investigative learning to develop high potentials in young people. *Sobredotação, 15*(1). 75–95.

# Freedom to Teach: Using Investigative Learning to Develop High Potentials in Young People

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*Suddenly I remembered why I had gone into teaching in the first place. I had forgotten, and I didn't even know I had forgotten. Then I remembered what I had always thought teaching would be all about.*
*—Middle School Teacher in the Enrichment Cluster Research Project*

Most teachers have had, at some point, a vision about what they thought teaching would be all about. They pictured themselves in classrooms with interested and excited students listening in rapt attention to fascinating tales about dangerous midnight movements on the Underground Railroad. They envisioned young people eagerly gathered around a science table discovering the mysteries of how things work or experiencing the Ah-ha that occurs when the relationships between a set of numbers starts to make sense. And they saw in their mind's eye a child's joy when hearing praise for a creative story or science project, eager to work in suggestions for making the project even better. And the most visionary prospective teachers fantasized about the letter or phone call from a former student saying that a play she wrote was going into production, and it all started when she was a student in the teacher's creative writing class so many years ago.

For many teachers, there is a disconnect between their vision of a challenging and rewarding career and the day-to-day grind so rampant throughout the profession. Perhaps most ironic about the separation between the ideal and the reality of today's classrooms is that most teachers have the skills and motivation to do the kinds of teaching about which they once dreamed. Unfortunately, the lists, regulations, and other peoples' requirements that are imposed upon them "from above" have resulted in both a prescriptive approach to teaching and a barrier to creating a challenging and exciting classroom. Over prescribing the work of teachers has, in some cases, lobotomized good teachers and denied them the creative teaching opportunities that attracted them to the profession in the first place. In her 1997 study, Linda Darling-Hammond reported that most teachers felt their views of good teaching were at odds with those of their school districts. Seventy-nine percent of the teachers participating in this study indicated that concerns for children and for learning are central to good teaching, but only 11% said that their school district shared this view. A large majority of teachers (75%) believed that their school officials favored behaviorist theories of learning rather than theories that are more child centered and constructivist.

This approach to learning described below provides a rationale and practical set of guidelines for a program that supports a different brand of learning from the approach that guides activities in many classrooms today. We call this brand "Investigative Learning" and the vehicles designed to deliver this more creative method of teaching are enrichment clusters. Enrichment clusters are student-centered—directed by student interest and the development of authentic products for real audiences—and are based on both common sense and research that challenges the assertion that important intellectual growth can only be charted through an information transfer and standardized testing approach to education (Gentry, Reis, & Moran, 1999; Reis & Gentry, 1998). We do not think that all prescribed, textbook-driven, standards-based teaching is bad, nor do we criticize the current national movement to improve the achievement test scores of our nation's young people. We believe that a good education *balances* a prescribed curriculum with regular, systematic opportunities that allow students to develop their abilities, interests, and learning styles. This balance must be achieved in an atmosphere that places a premium on enjoyment and collaboration as well as opportunities to engage in first-hand investigative activities and high levels of creative productivity. Even within the current trend toward an externally determined, "top-down" curriculum, teachers must have some opportunities to teach in a manner that is more consistent with the ideals that attracted them to the profession. As one teacher put it, "I am tired of being the administrator of a textbook and the victim of a system that fails to recognize my talents and creativity. Enrichment clusters gave me the opportunity to do some *real teaching*."

The main purpose for developing an enrichment cluster program is to create a time and a place within the school week when Investigative Learning is on the front burner of student and teacher activity. Although we would like to see more of this type of learning infused into the overall curriculum, the external forces that dominate most schools are simply too powerful to bring about massive, immediate change. Educational change seldom takes place at the center of things; instead, it evolves on the fringes where dedicated people exercise their judgment in the best interest of serving the young people for whom they are responsible. And successful change occurring on the edges has been found to seep its way toward the center. In the research we conducted on enrichment clusters, we found that many of the strategies teachers used to facilitate enrichment clusters found their way into everyday teaching practices in regular classrooms. Through strategies such as creative compliance and the infiltrator model of school change, we have witnessed remarkable changes taking place in mainstream classrooms.

## Why Investigative Learning Is Important for Our Schools and the Nation

Investigative Learning is based on an inductive approach to learning that provides students with opportunities to apply and extend the basic knowledge and skills that are the legitimate outcomes of a deductive learning model. Our aim is not to do away with deductive learning but, instead, to achieve balance between deductive and inductive learning. Introducing inductive learning into the school is important for several reasons. First, schools should be enjoyable places that students want to attend rather than places they endure as part of their journey toward assimilation into the job market and the adult world. Second, schools should be places in which students participate and prepare for intelligent, creative, and effective living. This type of living includes learning how to analyze, criticize, and select from alternative sources of information and courses of action; how to think effectively about unpredictable personal and interpersonal problems; how to live harmoniously with one another while remaining true to an

emerging personal system of attitudes, beliefs, and values; and how to confront, clarify, and act upon problems and situations in constructive and creative ways.

All of America knows that there are two school systems in our nation. One school system —the one that serves poor and mainly minority students—has generally failed to make the kind of progress that leads to improved achievement, progression into higher education, and improved standards of living. Billions of dollars and massive reform efforts aimed at addressing the problem of poor schools have focused largely on compensatory and remedial models. Most would agree that the positive results of these school reform efforts have ranged from minimal to nonexistent.

America's other school system—the one that serves mainly middle-class white students—has, by contrast, been successful enough to produce one of the most affluent and productive societies in the history of the world. Herein lies the problem: Endless state regulations, overly prescribed curriculum, and horrendous pressures to "get the scores up" have caused both school systems to buy into using more and more highly prescriptive didactic models of teaching. As a result, schools continue to withhold high level learning opportunities from poor children, and they are now slowly dismantling those aspects of our successful schools that have contributed to our nation's inventiveness, entrepreneurship, and creative productivity.

Investigative Learning is important because our society's economic and cultural growth, even our democratic way of life, depend on an unlimited reservoir of creative and effective people. One idea for a new product or the innovative and entrepreneurial action that results in the start of a new business has the potential to create millions of jobs or cultural enrichments that contribute to a better way of life for untold numbers of Americans. A small number of individuals will always emerge as creative thinkers and problem solvers, but we as a society cannot afford to leave the emergence of such leaders to chance, nor can we waste the undeveloped talents of so many of our young citizens who are the victims of poverty. All students must have opportunities to develop their unique talents and potentials and to lead constructive lives without trampling on or minimizing the value of others in the process. We have no argument with the importance of basic skill learning, but without an equal investment in the teaching and learning that promotes talent development, leadership, and creative productivity, our society may unwittingly be letting our schools devolve into the kind of education system that resembles a third world country.

## Learning Theory 101: The Short Course

Every teacher remembers taking a course in educational psychology in which they devoted a good portion of time to various theories of learning. Informal surveys with hundreds of teachers, however, reveal that very few remember much about these theories; and in most cases, if they do, they see little relevance between what was covered in the course and the work they do in classrooms. However, a couple of ideas about learning theory from those courses are very relevant, and we will focus on those few points. (Readers interested in a more detailed discussion of the theory underlying the brand of learning upon which our work is based can refer to "The Definition of High-End Learning," which can be found at https://gifted.uconn.edu/schoolwide-enrichment-model/semart/).

So let us begin Learning Theory 101. All learning exists on a continuum ranging from deductive or didactic approaches at one end to inductive or constructive approaches at the other. This continuum exists for learners of all ages—from toddlers to doctoral students—and it exists in all areas of curricular activity. The continuum also exists for learning that takes place in the nonschool world, the kind that young people and adults pursue as they go about acquiring new skills for their jobs or working in the kitchen, the garden, or the workshop in the basement. (There are, of course, occasions when a particular approach falls between the two ends of the continuum. However, for purposes of clarifying the main features of deductive and inductive learning, we will treat the two models as polar opposites.) Both models of learning and teaching are valuable in the overall process of schooling, and a well-balanced school program must make use of basic and high-end approaches as well as the combined approaches between the two ends of the continuum.

**The Deductive Model of Learning**

Although many names have been used to describe the theories that define the ends of the continuum, we simply refer to them as the Deductive Model and the Inductive Model. The Deductive Model is familiar to most educators and guides most of what takes place in classrooms and other places where formal learning is pursued. The Inductive Model, on the other hand, represents the kind of learning that typically takes place outside formal school situations. A good way to understand the difference between these two types of learning is to compare how learning takes place in a typical classroom with how someone learns new material or skills in real-world situations. Classrooms are characterized by relatively fixed time schedules, segmented subjects or topics, predetermined sets of information and activities, tests and grades to determine progress, and a pattern of organization that is largely driven by the need to acquire and assimilate information and skills that are deemed important by curriculum developers, textbook publishers, and committees who prepare lists of standards. The Deductive Model assumes that current learning will have transfer value for some future problem, course, occupational pursuit, or life activity.

Deductive learning is based mainly on the factory model or human engineering conception of schooling. The underlying psychological theory is behaviorism, and the theorists most frequently associated with this model are Ivan Pavlov, E. L. Thorndike, and B. F. Skinner. At the center of this ideology is the ability to produce desirable responses by presenting selected stimuli. In an educational setting, these theories translate into a form of structured training for purposes of knowledge and skill acquisition. A curriculum based on the Deductive Model must be examined in terms of both what and how something is taught. The issue of what is (or should be) taught has always been the subject of controversy, ranging from a conservative position that emphasizes a classical or basic education curriculum to a more liberal perspective that includes contemporary knowledge and life adjustment experiences (e.g., driver's education, sex education, computer literacy). Overall, American schools have been very effective in adapting what is taught to changes taking place in society. Recent concerns about the kinds of skills that a rapidly changing job market will require have accelerated curricular changes that prepare students for careers in technological fields and a post-industrial society. Nowhere is this change more evident than in the emphasis currently placed on thinking skills, interdisciplinary approaches to curriculum, and the use of technology in the learning process. These changes are

favorable developments, but the Deductive Model still limits learning because it *restricts* both what is taught and how the material is taught.

Although most schools have introduced teaching techniques that go beyond traditional drill and practice, the predominant instructional model continues to be a prescribed and presented approach to learning. The textbook, curriculum guide, or lists of standards prescribe what is to be taught, and the material is presented to students in a predetermined, linear, and sequential manner. Educators have become more clever and imaginative in escaping the restrictiveness of highly structured deductive models, and it is not uncommon to see teachers using approaches such as discovery learning, simulations, cooperative learning, inquiry training, problem-based learning, and concept learning. More recent approaches include simulated problem solving through interactive computer technology. Some of these approaches certainly make learning more active and enjoyable than traditional, content-based deductive learning, but the bottom line is that there are certain predetermined bodies of information and thinking processes that students are expected to acquire. The instructional effects of the Deductive Model are those directly achieved by leading the learner in prescribed directions. As indicated above, there is nothing inherently "wrong" with the Deductive Model; however, it is based on a limited conception of the role of the learner. It fails to consider variations in interests and learning styles, and it always places students in the roles of lesson learners and exercise doers rather than authentic, first-hand inquirers.

**The Inductive Model of Learning**

The Inductive Model, on the other hand, represents the kinds of learning that ordinarily occurs outside formal classrooms in places such as research laboratories, artists' studios and theaters, film and video production sets, business offices, service agencies, and almost any extracurricular activity in which products, performances, or services are pursued. The names most closely associated with inductive learning are John Dewey, Maria Montessori, and Jerome Bruner. The type of learning advocated by these theorists can be summarized as knowledge and skill acquisition gained from investigative and creative activities that are characterized by three requirements. First, there is a personalization of the topic or problem—the students are doing the work because they want to. Second, students are using methods of investigation or creative production that approximate the *modus operandi* of the practicing professional, even if the methodology is at a more junior level than that used by adult researchers, film makers, or business entrepreneurs. Third, the work is always geared toward the production of a product or service that is intended to have an impact on a particular audience. The information (content) and the skills (process) that are the substance of inductive learning situations are based on need-to-know and need-to-do requirements.

For example, if a group of students is interested in examining differences in attitudes toward dress codes or teenage dating between and within various groups (e.g., gender, grade, students vs. adults), they need certain background information. What have other studies on these topics revealed? Are there any national trends? Have other countries examined dress code or teenage dating issues? Where can these studies be found? Students will need to learn how to design authentic questionnaires, rating scales, and interview schedules and how to record, analyze, and report their findings in the most appropriate format (e.g., written, statistical, graphic, oral, dramatized). Finally, they will need to know how to identify potentially interested audiences,

the most appropriate presentation formats (based on a particular audience's level of comprehension), and how to open doors for publication and presentation opportunities. This example demonstrates how knowledge and skills that might otherwise be considered trivial or unimportant become instantaneously relevant because they are necessary to prepare a high-quality product. All resources, information, schedules, and sequences of events are directed toward this goal, and evaluation (rather than grading) is a function of the quality of the product or service as viewed through the eyes of a client, consumer, or other type of audience member. Everything that results in learning in a research laboratory, for example, is for present use. Therefore, looking up new information, conducting an experiment, analyzing results, or preparing a report is focused primarily on the present rather than the future. Even the amount of time devoted to a particular project cannot be determined in advance because the nature of the problem and the unknown obstacles that might be encountered prevent rigid, predetermined schedules.

**Learning Theory 101 Summarized**

The Deductive Model has dominated the ways in which most formal education is pursued, and the track record of the model has been less than impressive. One need only reflect for a moment on his or her own school experience to realize that with the exception of basic language and arithmetic, much of the compartmentalized material learned for some remote and ambiguous future situation is seldom used in the conduct of daily activities. The names of famous generals, geometric formulas, the periodic table, and parts of a plant learned outside an applicable, real-world situation are usually quickly forgotten. This is not to say that previously learned information is unimportant, but its relevancy, meaningfulness, and endurance for future use is minimized when it is almost always learned apart from situations that have personalized meaning for the learner.

Inductive learning, on the other hand, focuses on the *present use* of content and processes as a way of integrating material and thinking skills into the more enduring structure of the learner's repertoire. It is these more enduring structures that have the greatest amount of transfer value for future use. When content and processes are learned in authentic, contextual situations, they result in more meaningful uses of information and problem-solving strategies than the learning that takes place in artificial, preparation-for-the-test situations. If individuals involved in inductive learning experiences receive some choice in the domains and activities in which they are engaged and if the experiences are directed toward realistic and personalized goals, this type of learning creates its own relevancy and meaningfulness.

If people do, in fact, learn important content and skills outside of formal classroom situations, then it is important to examine the dimensions of this type of learning and the ways in which real-world learning can be brought into the school. However, bringing anything new into the school can be tricky business. The track record in this regard has been one of over structuring and institutionalizing even the most innovative approaches to learning. Many educators can remember how the much heralded concept of Discovery Learning ended up being what one teacher called "sneaky telling" and how a focus on thinking skills and creative thinking fell prey to the same types of formulas and prescribed activities that characterized the content-based curriculum that has been criticized so strongly by thinking skills advocates. Even the present fascination with computers and on-line learning is in some cases turning out to be little more than tutoring with electronic worksheets. But if we, as educators, can learn to view the Internet and

other media as a vast treasure chest of categorical and searchable information that can be sought out on a need-to-know basis, then we will begin to tap the true value of this resource for inductive learning experiences.

## Investigative Learning

To understand the essence of Investigative Learning is to compare how learning takes place in a traditional classroom with how someone might learn new material or skills in real-world situations. The majority of classrooms are characterized by an organizational pattern largely driven by the need to acquire and assimilate information and skills imposed from *outside* the classroom. Contrast this type of learning with the more natural chain of events that takes place in research laboratories, business offices, or film studios. In these situations, the goal is to produce a product or service. All resources, information, schedules, and events are directed toward this goal, and looking up new information, conducting experiments, analyzing results, or preparing a report are activities focused primarily on the *present need* for information rather than for a distant future. It is these present uses that have the greatest amount of transfer value for future use. When content and processes are learned in authentic, contextual situations, they result in more meaningful uses of information and problem-solving strategies than the learning that takes place in overly structured, prescribed classroom situations. In short, Investigative Learning applies two concepts—(1) high-end learning and (2) the often used (and abused) concept, real-world problems—to the Inductive Model of Learning.

### High-End Learning Defined

High-end learning is based on the ideas of a small number of philosophers, theorists, and researchers (e.g., John Dewey, Albert Bandura, Howard Gardner, Maria Montessori, Philip Phenix, Robert Sternberg, E. Paul Torrance, Alfred North Whitehead[1]). The work of these theorists, coupled with our own research and program development activities, has given rise to the concept that we call "high-end learning." The best way to define this concept is in terms of the following four principles:

1. Each learner is unique, and, therefore, all learning experiences must be examined in ways that take into account the abilities, interests, and learning styles of the individual.
2. Learning is more effective when students enjoy what they are doing. Consequently, learning experiences should be constructed and assessed with as much concern for enjoyment as for other goals.
3. Learning is more meaningful and enjoyable when content (i.e., knowledge) and process (i.e., thinking skills, methods of inquiry) are learned within the context of a real and present problem. Therefore, attention should be given to opportunities to personalize student choice in problem selection, the relevance of the problem for individuals and groups who share a common interest in the problem, and strategies for assisting students in personalizing problems they might choose to study.

[1] It is beyond the scope of this book to review the work of these eminent theorists and thinkers; the main concepts or ideas that each person has contributed to this approach to learning can be found in *Schools for Talent Development* (Renzulli, 1994, p. 203)

4. Some formal instruction may be used in high-end learning, but a major goal of this approach is to enhance knowledge and thinking skill acquisition gained through *teacher instruction* with applications of knowledge and skills that result from *student construction* of meaningfulness.

Many educators have asked us to be more precise about the goals of enrichment clusters. They want answers to questions such as "What are the specific skills that define high-end learning and how are these skills different from the traditional goals of didactic learning?" To address these questions, we used an inductive rather than deductive approach—that is, rather than making a list from the theoretical literature or our own expectations about goals and outcomes, we examined activities taking place in clusters, evaluated student work and teacher involvement, and drew conclusions based on these actual experiences. In other words, we did exactly what we are recommending students do as they go about pursuing problems in their enrichment clusters.

After carefully examining the work of numerous students and questioning many teachers who participated in the enrichment cluster research project, we were able to identify the following list of specific outcomes. Not all outcomes occurred in every cluster, and the levels to which any individual or group achieved these outcomes varied. Taken collectively, however, we believe that these learning behaviors represent a fairly comprehensive list of outcome goals. We recommend that you include such a list in a proposal for or description of an enrichment cluster program. The specific skills that are the goals of high-end learning include developing the ability to

- find and focus a problem that has personal relevance to the individual or group;
- distinguish between problem-specific, relevant and irrelevant information, identify bias in information sources, and transform factual information into usable knowledge that will help solve the problem;
- plan tasks that address the problem, sequence events in their most logical and practical order for attacking the problem, and consider alternative courses of action and their possible consequences;
- monitor one's understanding at each level of involvement and assess the need for gathering more advanced level information (content), methodological skills (process), and human or material resources;
- notice patterns, relationships, and discrepancies in the information gathered and use this information to refine tasks for addressing the problem and drawing comparisons and analogies to other problems;
- generate reasonable arguments and explanations for each decision and course of action;
- predict outcomes; apportion time, money, and resources; value the contributions of others to the collective effort; and work cooperatively for the common good of the group;
- examine ways in which problem-solving strategies from one situation can be adopted in or adapted to other problem-solving situations (Transfer of Learning);
- communicate in lively and professional ways to different audiences and in different genres and formats.

The ultimate goal of learning that is guided by the four principles and the specific goals or outcomes listed above is to replace dependence and passive learning with independence and engaged learning. Although all but the most conservative educators will agree with these principles and outcomes, much controversy exists about how these (or similar) principles and outcomes may be applied in everyday school situations. Some might view these principles as yet another idealized list of generalities that cannot be easily manifested in schools already overwhelmed by prescribed curriculum and deductive models of teaching. For this reason, we have provided guidelines for developing schedules that inserts enrichment clusters into the regular school week without forcing out other activities. By setting aside a time and following a simple set of guidelines, all students will have opportunities to participate in high-end learning experiences sometime during their school week.

The most difficult part of facilitating high-end learning is getting teachers to stop prescribing and to replace traditional instruction with the kinds of "guide-on-the-side" responsibilities that are used by mentors and coaches. People in these roles instruct only when there is a direct need to accomplish a task necessary for developing a product or service. Many teachers who have served in extracurricular activities as yearbook advisors, drama club directors, 4-H Club advisors, or athletic coaches already have the techniques necessary for high-end learning. The basic characteristics of extracurricular activities follow:

- Students and teachers select the area in which they participate.
- They produce products and/or services that are intended to have an impact on a particular audience.
- They use the authentic methods and advanced level content of professionals to produce their product or service. They may operate at a more junior level than adult professionals, but their goal is exactly the same—to produce a product or service of as high quality as possible within their level of experience and the availability of resources.

The teacher's role in these activities is to guide students as they find and focus a real-world problem, lend a hand as they locate content and methodological resources, and help them understand how to use the resources. For example, in a cluster that examined the incidence of acid rain in the northeastern part of the United States, the teacher taught students how to prepare slides for microscope analysis and, with the aid of a microprojector, showed then how to identify contaminants in their rainwater samples. Direct instruction should take place *only* when the acquisition of a new skill needs some explanation and demonstration by the teacher.

**"Real-World Problem" Defined**

The term "real-world problem" has been tossed around so freely and easily in education circles these days that it has become little more than a hollow cliché. Because a good deal of the focus of enrichment clusters is on the pursuit of real-world problems, we feel obligated to provide the reader with as precise a definition as possible about this oft-used but frequently elusive (and illusive) term.

Enrichment clusters are designed to promote the kind of high-end learning described above, and a key concept in organizing and delivering services for this type of learning is *application*. High-end learning consists of *applying* relevant knowledge, research skills, creative and critical thinking skills, and interpersonal skills to the solution of real problems. But what makes a problem real? We define a real-world problem in terms of four essential elements.

**1. Personalization of the problem.** First, a real problem requires a personal frame of reference for the individual or group pursuing the problem. In other words, the problem must involve an emotional or internal commitment to action in addition to a cognitive or scholarly interest or simply wanting to find out more about something. Something that is a real problem for one individual or group may not be a real problem for others. For example, stating that global warming or urban crime are "real problems" does not make them real for an individual or group unless they decide to *do something* to address the problem. For these reasons, problems pursued in enrichment clusters must not be predetermined by the teacher or externally assigned.[2] Teachers might help in problem finding and focusing, but students within the cluster should be the main decision makers for selecting the problem and the ways in which it will be pursued. This self-selection provides the ownership and commitment that is needed to work on the development of a product or service for an extended period of time. Teachers and other adults can provide guidance, but they must avoid crossing the line from suggestion to prescription. Divisions of labor within clusters allow individuals to specialize in some aspect of the problem and product, thus increasing opportunities for students to place a personal stamp on any given problem and product.

**2. Open-endedness of the problem.** A second essential element of real problems is that they do not have existing or unique solutions for the groups or individuals addressing the problem. If an agreed-upon solution, already existing right answer, or prescribed strategy for solving the problem exists, then it is more appropriately classified as a training exercise. Even simulations based on approximations of real-world events are considered training exercises if their main purpose is to teach predetermined content or thinking skills. Professionals solve problems in order to bring about some form of change in the actions, attitudes, or beliefs of a targeted audience or because they want to contribute something new to the sciences, arts, humanities, or other areas of human productivity. We use the word "new" here in a local rather than global way. It is not necessary for young people to make contributions that are new for all humankind. Replications of studies that have been done many times before can be new in a relative sense if they are based on new data gathered locally or a new wrinkle in the data that makes the study different from the work of others. For example, a group of young people who gathered, analyzed, and reported on data about television-watching habits in their community were contributing information that was new, in a local sense, even though similar studies had been done in other communities.

**3. Authentic methodology and advanced content.** The third essential element of a real problem is that the problem is addressed using authentic methods that applies advanced

[2] An exception to this requirement might be an enrichment cluster formed around an established program (e.g., Math League, International Future Problem Solving, Odyssey of the Mind) that specifies one or more problems for state or national competitions. The criterion, however, is partially met because students ordinarily volunteer for such programs.

content—that is, by employing the methodology, knowledge, and materials typically used by investigators and creative producers in the various disciplines. Enrichment clusters ask students to assume the roles of practicing professionals to develop the skills of first-hand investigators as they apply cutting-edge knowledge and content from the area of study. These roles and skills may be at a more junior level than adult journalists, historians, artists, environmentalists, filmmakers, or other professionals, but they are clearly different from the typical school role of student as lesson-learner. Using authentic methods is critical because one of the goals of inductive learning is to help young people extend their skills beyond the usual kinds of products that often result when teachers and students view "research" as merely looking up and reporting information. Authentic methodology lends itself to authentic products.

Similarly, in an enrichment cluster, students construct meaning and consult advanced references and sources as professionals would. Though some reporting of previously known information is a necessary part of most investigations (in the professional world, the pursuit of new knowledge should always begin with a review of what is already known about a given topic), the end result should be a creative contribution that goes beyond existing information that can be found in encyclopedias, on the web, or in the "all about" books that occupy most library shelves.

Every field of organized knowledge can be defined, in part, by its methodology, and the methodology of most fields can be found in certain kinds of guidebooks or manuals. These "how-to" books are the key to escalating studies beyond the traditional report writing approach that often passes for research. In a book based on this approach to teaching (Renzulli, Gentry, & Reis, 2003), we describe in detail examples of these books and the ways in which teachers can access various sources of methodological information. Likewise, the content of a field is often organized in books about the specific topic, found on the web, and in current journals of the field. To obtain advanced knowledge, students and cluster facilitators alike can connect with experts in their areas of pursuit.

Every field of knowledge can also be defined in part by the kinds of data that represent the raw material of the field. New contributions are made in a field when investigators apply well-defined methods to the process of making sense out of random bits and pieces of information. Although some investigations require levels of sophistication and equipment that are far beyond the reach of student investigators, almost every field of knowledge has entry level and junior level data-gathering opportunities.

**4. Authentic audiences.** The final essential element of real problems is that they are directed toward real audiences. Real audiences are a major part of the *raison d'être* of the practicing professional upon which this model of learning and teaching is based. Professionals produce creative products for specific clients and audiences. Writers hope to influence the thoughts and emotions of their readers, scientists do research to find better ways to cure diseases or make better products, and artists create products to enrich the lives of those who view their works. Students within enrichment clusters also need to develop their work for a real audience. Audiences may change as the work evolves, but they serve as targets that give purpose and direction to the work. Any teacher who has been involved in the production of a school concert or play knows how anticipation of opening night focuses the preparation, precision, and quality of the performance. The same striving for excellence can be found in groups responsible for

publishing a school newspaper, yearbook, or developing a community action project. A sense of audience contributes greatly to task commitment and concern for excellence.

Real audiences consist of people who voluntarily attend to information, events, services, or objects. What one group of students did with the results of their local oral history project illustrates the difference between a real and a contrived audience. Although this group first presented their findings to classmates, they did so mainly to rehearse presentation skills. Their authentic audience consisted of members of a local historical society and individuals who read about the student research in the local newspaper and a historical society newsletter.

## The Assembly Plant of the Mind

Investigative Learning consists of investigative activities and the development of creative products in which students assume roles as first-hand investigators, writers, artists, or other types of practicing professionals. Although students pursue this kind of involvement at a more junior level than adult professionals, the overriding purpose is to create situations in which young people are thinking, feeling, and doing what practicing professionals do in the delivery of products and services. Student-driven should achieve the following five objectives:

1. Students receive opportunities, resources, and encouragement to apply their interests, knowledge, thinking skills, creative ideas, and task commitment to self-selected problems or areas of study.
2. Students acquire advanced-level understanding of the knowledge and methodology used within particular disciplines, artistic areas of expression, and interdisciplinary studies.
3. Students develop authentic products or services that are directed primarily toward bringing about a desired impact on one or more specified audiences.
4. Students develop self-directed learning skills in the areas of planning, problem finding and focusing, organizational skills, resource utilization, time management, cooperativeness, decision making, and self-evaluation.
5. Students develop task commitment, self-confidence, feelings of creative accomplishment, and the ability to interact effectively with other students and adults who share common goals and interests.

Investigative Learning focuses on the pursuit of real problems and should be viewed as the vehicle through which everything—from basic skills to advanced content and processes—comes together in the form of student-developed products and services. In much the same way that all the separate but interrelated parts of an automobile come together at an assembly plant, we view this form of learning as an assembly plant of the mind. This kind of learning represents a synthesis and an application of content, process, and personal involvement. The student's role is transformed from one of lesson-learner to first-hand inquirer, and the role of the teacher changes from an instructor and disseminator of knowledge to a combination of coach, resource procurer, mentor, and, sometimes, a partner or colleague. Although products play an important role in creating these authentic learning situations, the development and application of a wide range of cognitive, affective, and motivational processes are the major goals of this type of learning.

## Key Resources

This brief excursion through the complexities of learning theory and the thinking behind Investigative Learning is important because it will help you understand the big picture of what we are trying to achieve through enrichment clusters. Although any change from the status quo is always a little intimidating at the start, we have achieved a fair amount of success by gaining faculty, administrative, and parental consensus on a small number of easy-to-understand concepts and related services and by providing resources and professional development related to specific service delivery procedures.

Enrichment clusters represent part of a general plan—called the Schoolwide Enrichment Model (SEM) (Renzulli & Reis, 1997)—to develop the gifts and talents of all young people. Although enrichment clusters can be developed and implemented independently from the overall Schoolwide Enrichment Model, some of the underlying theory, research, and practical know-how surrounding SEM on developing gifts and talents can be useful to program developers for both background information and for expanding the continuum of services based on this common goal. The following key resources provide valuable information about SEM as well as schoolwide enrichment in general:

- Reis, S. M., Burns, D. E., & Renzulli, J. S. (1992). ***Curriculum compacting: The complete guide to modifying the regular curriculum for high-ability students***. Mansfield Center, CT: Creative Learning Press.
  Teachers learn how to streamline the regular curriculum in order to provide time for more challenging enrichment and acceleration activities.
- Renzulli, J. S. (1997). ***Interest-A-Lyzer family of instruments: A manual for teachers***. Mansfield Center, CT: Creative Learning Press.
  This manual describes six interest assessment instruments that invite students to examine present and potential interests and explains how to administer and interpret these tools.
- Renzulli, J. S., Rizza, M. G., & Smith, L. H. (2002). ***Learning styles inventory (Version III)***. Mansfield Center, CT: Creative Learning Press.
  To help teachers identify student preferences for common instructional techniques, this manual details how to administer and score the *LSI* instruments as well as the theoretical rational for identifying learning styles.
- Kettle, K. E., Renzulli, J. S., & Rizza, M. G. (1998). Products of mind: Exploring student preferences for product development using *My Way: An Expression Style Inventory. Gifted Child Quarterly, 42*(1), 48–57.
  https://doi.org/10.1177/001698629804200106
  *My Way* helps teachers and students determine which kind of products students are interested in creating.
- Renzulli, J. S., & Reis, S. M. (1997). ***The schoolwide enrichment model: A how-to guide for educational excellence (2nd ed.)***. Mansfield Center, CT: Creative Learning Press.
  This resource offers practical advice for achieving educational excellence in today's schools through an SEM program.

- Renzulli, J. S., Gentry, M., & Reis, S. M. (2003). ***Enrichment clusters: A practical plan for real-world, student driven learning.*** Mansfield center, CT: Creative Learning Press.
- Purcell, J. H., & Renzulli, J. S. (1998). ***Total talent portfolio: A systematic plan to identify and nurture gifts and talents***. Mansfield Center, CT: Creative Learning Press. Keeping Total Talent Portfolios for students helps schools assemble important information about students' abilities, interests, and preferences that aid teachers in deciding which types of enrichment and acceleration options will most benefit students. This resource is now available in electronic format at https://renzullilearning.com.

## References


Gentry, M., Reis, S. M., & Moran, C. (1999). Expanding enrichment program opportunities to all students: The story of one school. *Gifted Child Today, 22*(4), 36–48.

Reis, S. M., & Gentry, M. (1998). The application of enrichment clusters to teachers' classroom practices. *Journal for the Education of the Gifted, 21*(3), 310–334. https://doi.org/10.1177/016235329802100304

Renzulli, J. S. (1994). *Schools for talent development: A comprehensive plan for total school improvement*. Creative Learning Press.

Renzulli, J. S., Gentry, M., & Reis, S. M. (2003). *Enrichment clusters: A practical plan for real-world, student-driven learning*. Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1997). *The Schoolwide Enrichment Model: A how-to guide for educational excellence* (2nd ed.). Creative Learning Press.