

Modification Techniques

From *The Parallel Curriculum*

by Tomlinson, Kaplan, Renzulli, Purcell, Leppien, and Burns

Content Standards

- Identify the major disciplines of knowledge in the unit
- Find the big ideas in each discipline by consulting an expert in the discipline, national and state standards, and/or a college textbook
- Target the concepts, principles, skills, and dispositions from the world of the practicing professionals that best match the goals and purposes of the curriculum unit
- Diagram standards to make a list of essential knowledge, concepts, principles, skills, and dispositions of the discipline
- Identify appropriate representative topics
- Develop or remodel curriculum units to address key concepts, principles, skills in the discipline through the use of representative topics
- Consider which methodologies (tools, procedures, and skills) of a specific discipline might assist students in: answering their own research questions, probing the meaning of the key ideas of the discipline, and testing the adaptability of those ideas in other contexts
- Determine the types of questions, problems, or discrepant events that will be uncovered by the students as they apply the research methodologies
- Consider how the students will use the information they discover in their investigations to deepen their understanding of key principles and concepts and their relationships
- Determine the type of problem-solving process or modes of inquiry that will be used to solve problems or investigate questions
- Work with students to generate questions, determine the methodologies and procedures for carrying out the investigation, gather and analyze data, reach conclusions, and determine the implications of the research findings
- Identify which habits of mind are to be developed through the use of this learning experience
- Consider which ethical issues or problems can be used as subjects for the investigation
- Identify the modes of inquiry that are listed in national standards documents
- Consider objectives from the Secretary's Commission on Achieving Necessary Skills (SCANS) Report which address essential workplace skills
- Expect and foster changes and increasing levels of cognitive sophistication
- Make appropriate accommodations in the unit to address patterns in students' learning and work profiles (learning styles, interests, expression styles) and to reflect consistently on what they learn about themselves through their work

Assessment

- Pre- and post-assess students for growth in knowledge of major facts, concepts, principles, and skills within the topic or discipline
- Create longitudinal rubrics to identify the stages of talent development in students in a variety of content areas. Use the rubric to note the evolution of student abilities in the classroom, determine where each student is on the novice to expert continuum, and decide on strategies that can be used to guide the student to the next level of proficiency
- Determine the varying levels of sophistication, expertise, or technical proficiency in the use of methodological skills to assist learners toward continued growth
- Consider how students will demonstrate their understanding and use of methodological skills, how their knowledge has changed over time, and the degree to which they interpret, apply, and transfer the knowledge and skills that they have gained to new contexts
- Determine which products will be used to communicate new understandings and document growth
- Consider a variety of products that can be used to show evidence of understanding of new ideas, new connections, transformations of existing ideas in new contexts, and flexibility in acquiring data—provide student choice in assessment tasks

- Provide ample opportunities for students to communicate their findings in a variety of formats
- Develop rubrics that measure students' knowledge of concepts, principles, and skills
- Consider concept maps as an assessment format
- Observe and note changes in behavior (e.g., persistence, independence, skepticism) over time
- Use assessment formats that require student reflection (e.g., goal statements, reflective essays, longitudinal portfolios, journals, and personal discoveries)
- Provide time for students to document and analyze their own learning and work profile over time and identify emerging patterns and trends
- Ensure systematic opportunities for students to reflect upon their past, present, and future selves

Introductory Activities

- Provide students with concept maps
- Develop and share advance organizers that support development of concepts and principles
- Provide students with a graphic organizer of all the fields within a discipline so that they can visualize the range of work done by practitioners within a discipline
- Use focusing questions to help students assess their prior knowledge related to key concepts, principles, and skills
- Use problems, dilemmas, and discrepant events to justify the need for methodological skills
- Develop initial learning experiences that show students what experts at the frontier of the discipline investigate
- Provide an introduction that explains how the topic students are studying is representative of the discipline at large
- Identify experts who can assist students in identifying problems, developing technical expertise in the use of inquiry skills, and knowing which tools and procedures to use to best address these problems
- Share with students an array of products that professionals in the discipline produce
- Read aloud to students about famous and infamous people who have contributed to the field (especially books that portray the famous people at the approximate age of the students)
- Introduce a timeline of important turning points in the discipline that include the names and contributions of eminent people of both genders and a variety of cultures within the field
- Brainstorm personal characteristics of practicing professionals within the field now and at earlier ages; call upon students to compare their own interests and abilities to those of practicing professionals
- Share revealing audio-clips, segments of documentaries, and newspaper articles about important moments and the people who shaped those moments

Teaching Activities

- Use a variety of teaching methods to support and scaffold learning; adjust and match methods to the learners as they demonstrate continued growth
- Use inquiry teaching methods with debriefing techniques in accordance with the goal of developing behaviors used by scholars
- Develop or provide simulations or role-playing—opportunities that mimic the role of information analyst
- Use a Concept Attainment Model, coupled with examples and nonexamples, to teach new concept categories
- Use Wasserman's (1988) Play-Debrief-Replay method during examination of data, tables, examples, observations, or hands-on discovery
- Use questioning and Socratic techniques to support the examination and classification of data, concept development, and identification of principles and rules
- Teach inductively, beginning with examples, and foster the rules and principles that explain patterns and relationships
- Generate questions for students' written reflection and discussion throughout the unit to assist students in thinking about the knowledge that practitioners in the field use, problems they

address, ways they work, personality traits, career development, personal and work goals, and so forth and what students can learn about themselves through examining these elements

- Use independent investigations to provide students opportunities to study research on, contributions of, and working modes in the discipline
- Use shadowing experiences and mentorships to provide students with firsthand opportunities to learn about the day-to-day routines, values, and beliefs of professionals in the field
- Use problem-based learning
- Use visualization techniques to assist students in reflecting on past, current, and future selves

Learning Activities

- Make sure that the learning activities are those that provide opportunities for students to use the tools (mental, material, methodological, technological) of the professional to acquire new information, enhance learning, and engage in research
- Select activities that target the development of essential principles and concepts or encourage the inquiry process
- Have students analyze and talk about examples, information, and data in small groups using a cooperative learning or guided discussion format
- Have students use raw data, examples, events, and observations to detect patterns and draw conclusions
- Ask students to suggest and test principles
- Ask students to work as firsthand inquirers and analysts in the discipline
- Have students focus on analytic and problem-solving skills as employed in the discipline
- Provide opportunities for students to note characteristics and attributes, and search for patterns, sequences, relationships, and categories
- Introduce and provide practice to students to the steps of research and problem-solving
- Use graphical techniques to analyze data
- Use a combination of verbal and visual representations for increased understanding
- Have students use a multiple-step process to identify, research, and plan to solve a problem that requires a novel or unknown solution
- Help students formulate questions that they want to answer
- Ask students to use appropriate criteria to select the best possible alternative in making decisions
- Ask students to rank, prioritize, and sequence the steps involved in an independent investigation
- Help students develop or refine the ability to set appropriate goals for their work (including allocation of mental and physical resources), use those goals to guide their work, modify the goals as work progresses, and assess their work according to their goals
- Help students develop the skills of introspection and the ability to compare and contrast their own personal characteristics and goals with those of the practicing professional

Resources

- Locate, reproduce, and distribute samples of research studies and investigations in the discipline or field
- Provide biographies of historical and contemporary inquirers, inventors, and researchers in the field
- Provide journals, blank charts, tables, and diagrams so that students can record their data, reflect on their learning experiences, and outline a schema that represents their understanding of the relationships between concepts and principles
- Develop and share a format for developing hypotheses, designing studies, recording data, and formulating conclusions
- Provide students with concept maps and advance organizers that preview the important concepts and principles explored in the unit
- Provide graphic organizers to support cognitive and methodological skill acquisition
- Develop clear directions and expectations for data analysis, observations, field studies, and independent study
- Identify and locate numerous examples related to the concepts addressed in the unit

- Locate videos, audiotapes, books, newspapers, journal articles, artifacts, photographs, artwork, electronic information, photographs, experts, primary and secondary source documents, and methodological guides (how-to books) to support student research and that chronicle significant events in the lives of people who have contributed to a field
- Provide students with a wide variety of example-products created by practicing professionals in the discipline. Provide time for students to examine the collection and ask questions

Grouping Strategies

- Use individual conferences to discuss student interests, reflection, growth in learning and work profiles, and to forward student learning related to competencies in both content and personal reflection
- Observe individual students and provide feedback to support the development of analytic thinking
- Use small groups with flexible membership for (1) interest-based explorations related to the curriculum content, (2) analysis of the class learning, (3) debriefing activities, and (4) extension activities
- Use small groups with flexible membership when (1) students need to work with those of similar ability, skill, and depth of knowledge for acceleration/advanced study, or (2) students need to work with those of differing abilities and skills for a comprehensive approach to a problem
- Provide space and opportunities for students to work in small groups or individually based on learning style preference
- Use pairs for think-alouds that support students' reflection and self-assessment, students' analyses of their learning for emerging themes and patterns, and students' editing
- Work with large groups of students to provide an overview of the unit, introduce the learning, provide directions, hear guest speakers, participate in field experiences, and debrief to ensure that the entire class can connect activities, data, and examples to core concepts and principles
- Employ multi-aged and cross-grade level groupings based on students' readiness levels

Products

- Ask students to create products that reflect their inquiry and analysis work
- Ask students to make predictions, explain patterns, and demonstrate the relationship between raw data and primary source information and the core concepts and principles in the discipline
- Ask students to demonstrate connections between unit activities and experiences and the concepts and principles in the discipline. Reflective essays, journal entries, charts, diagrams, and collages support this task
- Have students develop their own concept maps and/or graphic organizers to communicate their acquisition of understanding and skills
- Select from a variety of products that are close approximations of the types of products that practicing professionals create in their fields (e.g., gallery displays, documentaries, books, articles, social action plans, compositions, and scientific studies)
- Consider the audience that can best provide students with authentic evaluation of their work
- Provide students with regular opportunities to analyze and reflect on products of practicing professionals
- Encourage students to create portfolios of their best work samples. Provide opportunities for students to assess the growth reflected in the chronology of their portfolio pieces
- Ensure that students have the opportunity for self-assessment using rubrics that have been designed for products and performances
- Provide students with systematic opportunities to reflect on who they are becoming as learners and workers

Extensions

- Be sure that extension activities stem from or relate back to the key concepts and principles that give meaning to the content (stuff, not fluff)
- Listen carefully for other questions that students raise prior to, during, and after instruction

- Ask specialists in GT, content, media, and technology to support, team-teach, coach, and/or provide feedback for student learning
- Determine other areas in which students want to explore, practice, or apply newly acquired skills of practice
- Provide opportunities for students to make cross-disciplinary connections and applications
- Provide opportunities for students to be involved with simulations related to the curriculum unit and their interests
- Provide opportunities for students to visit or correspond with experts and other professionals in related areas
- Ask a guest speaker to talk about cutting-edge research questions and state-of-the-art research techniques in their work and discipline
- Locate Web quests related to the curriculum topic
- Arrange for shadowing experiences, internships, or mentorships

Differentiation Based on Learner Need Including Ascending Intellectual Demand

- Be aware that students are at different levels (between students and within individual students) of development with respect to the content goals of the unit, interest in the discipline, and ability to be introspective
- Provide support for students who may have potential in the field but who have not yet displayed interest in the topic and/or discipline
- Increase or decrease your scaffolding to support concept attainment and cognitive processing
- Use deductive and inductive questioning to support and scaffold students' understanding
- Provide additional representative topics for comparison to reduce ambiguity or to add additional layers of complexity
- Encourage a continuing commitment to intrinsic motivation and to the world of ideas
- Ask students to examine ramifications, exceptions, or extensions of the basic concepts, principles, and skills
- Provide students with additional raw data to examine
- Select resources and products based on student challenge level; escalate levels during process
- Provide opportunities for students to guide their own inquiries
- Devise tasks and products that cause students to develop through application personal frameworks of knowledge, understanding, and skill related to the discipline
- Guide students in establishing their own goals for work at what they believe to be the next steps of research
- Escalate the level of analysis for the investigation
- Provide an array of materials to accommodate students' interests, prior experiences, reading abilities, and ability to draw inferences
- Assess students' current level of awareness of generic working skills such as time management, ability to work in a team, leadership skills, responsibility, sociability, etc., as they relate to practitioners in the discipline and to self

Another view is the Differentiated Model of Giftedness and Talent (DMGT): Ten Commandments for Academic Talent Development by Francoys Gagne in *The Gifted Child Quarterly*, 2007, No. 2