STEM to debating: Differentiating for your class

Differentiation is good teaching practice. It enables support for students who require scaffolding and ensures that students with high learning potential are given active opportunities to engage in learning that has modified pace, depth and complexity.

Debating

All students can be actively involved in a whole class debate by drawing from a range of models and employing evidence-based pedagogy to create appropriate differentiation adjustments.

Debating can be a particularly appealing field for High Potential and Gifted (HPG) students. Gross (2011) and VanTassel Baska (1996) note that cognitive characteristics of gifted students include engagement in areas of interest, well developed memory, high curiosity, imaginative expression, being articulate with a well-developed vocabulary, advanced reading ability, interest in the subtleties of words, social poise, thrive on intellectual challenge, high reasoning and flexible thinking. The field of debating can respond to many of these attributes and can enable changes to pace, depth and complexity to better suit HPG students.

A Whole Class Debating activity incorporates elements of the Maker and Williams model as well as the teaching-learning cycle (Killian, 2015; Spycher, 2017). Using this instructional cycle to explicitly teach how to structure examples arguments and rebuttal and the gradual release of responsibility, ensures that all students have a base of understanding of fundamental debate structures. After context and common debating templates are given, the class then splits into affirmative and negative teams to compile their case. Students are selected to be 1st, 2nd, 3rd speakers and a team organiser, with the rest of the class acting as 4th speakers who focus on rebuttal. The speaker roles can be filled by experienced debaters, HPG students or students given higher levels of support templates. The final organiser role is best filled by a HPG student with some experience in debating as it involves higher order levels of thinking such as analysis, evaluation and synthesis.

Maker model differentiation that can be applied to process, product, content and environment – students can be supported through scaffolding, prior learning, routines, templates, peer learning, flexible grouping, and tutoring. Students can be extended and enriched through varied timing, flexible grouping, authentic audiences, mentors and external opportunities.

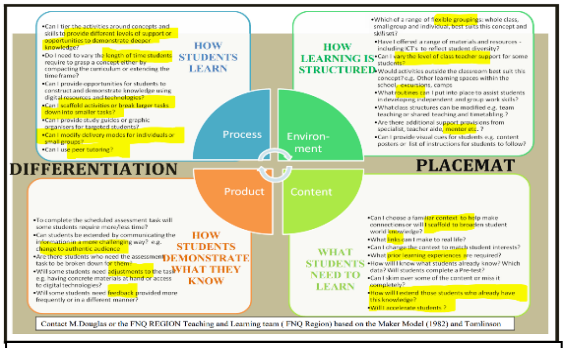

Figure 1: Maker Model

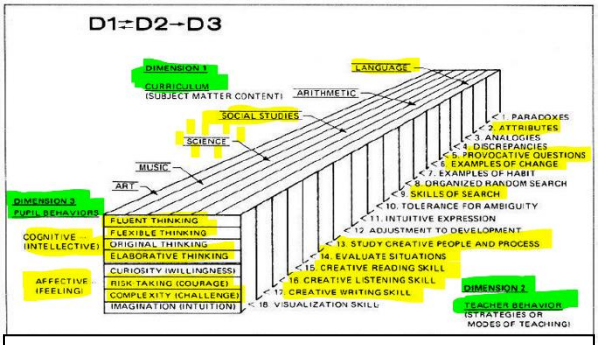

Figure 2: Williams Model

The Williams Model can be applied to debating – this model aims to encourage creative and critical thinking in HPG students. Attribute listing can be incorporated through noting and analysing of properties of a theme. Debate topic questions, and research pathways can be framed by targetting

specific provocative questions. Examples of change can be embedded into future projections related to theme or topic that then form key arguments for the debate. Skills of search are modelled and moved from low to high model thinking skills. Students are led to evaluate situations, thinking of consequences, what ifs and linked implications. The study of creative process, reading, listening and writing promotes fluency of idea generation and structured communication.

STEM

Open ended STEM tasks offer opportunities to differentiate and provide personalised learning for all students. STEM can stimulate high engagement from students. By the nature of the design process, and the iteration stage in particular, STEM nurtures perseverance and resilience.

Moving from theory into STEM tasks and then using the design process as a clear structure, all students can engage in the core task. Students can be encouraged to spend greater time on certain aspects of the design process as relevant to their learning profile and readiness. Students who can struggle with more open-ended tasks can be given a model to then innovate on, rather than starting from scratch. Students who find idea generation challenging can work in pairs. Teachers can also prompt, and value, group knowledge by asking all students to share ideas and preliminary sketches back with the whole group. Students who show strength in this area can focus on gathering data from prototyping and using data to influence design, justifying choices and explaining the earlier theory in application to their specific model.

Applying the Kaplan model to STEM- Using thematic based differentiation in early research and exploration of relevant theory allows students to gain a 'big picture' and explore underpinning scientific concepts. Students can participate in learning that is not necessarily linear but aligns to interests and real-world examples. The emphasis on particular elements of the design process can be individually modified to suit individuals. Through the open-ended task students final prototypes are wide ranging in materials and complexity. Affective outcomes are also articulated and become a goal of the process.

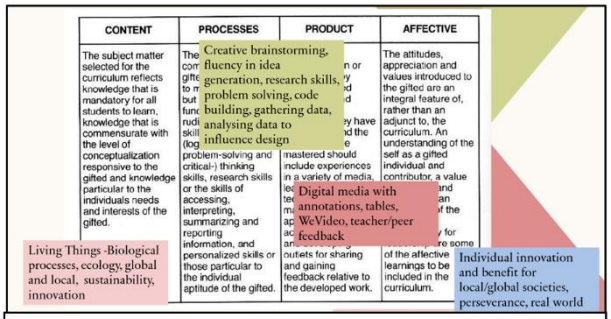

Figure 3: Kaplan Model

Applying the Tomlinson model to STEM- similar to the models of Kaplan and Maker, Tomlinson also proposes modification of content, process and product. With a higher focus on process, this model works from the point of current student need, harnesses student interests and examines learning profiles. Learner profile aspect speaks to the 'efficiency' of learning that incorporates preferred modes and culture. There is strong alignment here for including Aboriginal pedagogies in STEM activities. Tomlinson notes, that classrooms that are attentive to student variance enable more students to benefit and grow. STEM can provide challenge and differentiation in all its phases and engage all students in active, enjoyable and hands on learning experiences.

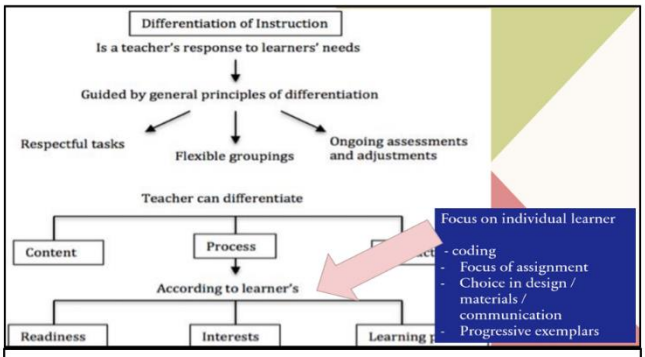

Figure 4: Tomlinson Model

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