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## Integrating Differentiated Instruction with Multiple Intelligences

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## RESEARCH REPORT

# Integrating Differentiated Instruction with Multiple Intelligences

M Chandra Subhashini

### Abstract

**Context:** The research was conducted at an international school in India utilizing the International Baccalaureate curriculum, which prioritizes inquiry-based learning and critical thinking. The diverse learner population comprises individuals from various cultural and academic backgrounds, necessitating differentiated instruction to cater to their unique strengths and challenges. The focus was on Grade 7 Mathematics assessments which require learners to apply and communicate mathematical concepts effectively.

**Aims:** This inquiry aimed to discover how to enhance learning by integrating Differentiated Instruction with Gardner's model of Multiple Intelligences. The primary objective was to create educational pathways that accommodated the diverse needs of learners, fostering deep conceptual understanding and preparing them adequately for forthcoming assessments.

**Methods:** The study employed various instructional strategies, including the RAFT (Role, Audience, Format, Topic) technique, and was underpinned by prominent educational theories such as Piaget's cognitive constructivism and Gardner's Multiple Intelligences. Classroom observations, mentor feedback, student feedback forms, and collaborative discussions were used to evaluate the effectiveness of implemented strategies.

**Findings:** Key findings revealed that the integration of Multiple Intelligences facilitated engagement and learning, with learners actively applying mathematical concepts in real-world contexts. The RAFT technique was particularly effective. Class activity results indicated that students were more engaged when given choices in assignments aligned with their strengths. Using structured observation and feedback, it was noted that some students still struggled with participation due to hesitance in sharing their thought processes, indicating the continued need for tailored support.

**Implications:** The inquiry illustrates the potential of reflective practice in refining teaching strategies. Other educators may find value in using differentiated approaches based on learners' strengths and interests, as well as leveraging multiple feedback methods to enhance student engagement and academic performance. It highlights the importance of continuous professional development and collaborative reflection among educators for effective teaching.

**Keywords:** mathematics, differentiated instruction, multiple intelligences theory, reflective practice, inquiry-based learning

## Context

My research was conducted at an international school in India that follows the International Baccalaureate (IB) curriculum, emphasizing critical thinking, inquiry-based learning and holistic development. The diverse learner body engages in collaborative learning, interdisciplinary projects and service initiatives, fostering global citizenship. With a residential campus, learners from different backgrounds live and learn together, enhancing cross-cultural understanding. In IB Mathematics, Criterion A assesses learners' ability to recall and apply mathematical concepts accurately. Criterion B focuses on identifying and generalising patterns through inquiry and problem-solving. Criterion C evaluates clear mathematical communication using correct notation, explanations and representations. Criterion D emphasizes applying math to real-world contexts, requiring interpretation, modelling and justification of solutions.

My learner group comprised 24 Grade 7 learners, approximately 12 years old, from diverse cultural and academic backgrounds, each exhibiting unique learning abilities. Having been exposed to varied pedagogical approaches, their learning experiences needed to be differentiated to cater to their varied learning needs and preferences” or something less tied to these theories. The school fostered an inclusive and globally focused learning environment, where instructional strategies had to be tailored to individual strengths while promoting collaborative learning and autonomy. Despite differing socioeconomic contexts, learners demonstrated strong interpersonal skills and planning learning experiences required an awareness of their cognitive diversity. A few learners with specific learning difficulties needed additional scaffolding and personalised interventions to enhance their engagement and progress.

To enhance learners’ readiness for IB Middle year Programme (MYP) mathematics assessment we need to cater diverse learning needs and foster deeper conceptual understanding. By tailoring instruction to learners' strengths learners engage with content in ways that resonate with them. This approach strengthens their ability to recall concepts (Criterion A), recognise patterns (Criterion B), communicate mathematical reasoning (Criterion C), and apply math to real-world situations (Criterion D), ensuring they are well-prepared for assessments.

## Motivation and Focus

The teacher can reshape thinking and practice by continuously reflecting on the things that went well and things that need to improve. Therefore, a teacher must follow the reflection cycle process until it is well grounded in one`s practice. Though I am strong with the knowledge of the mathematics content and clear with the abilities of my learners, I could not make rapid subtle pedagogical moves to lead the classes in a fruitful direction. I reflected critically, that despite implementing differentiated tasks, some learners still failed to connect classroom activities to meaningful learning, impacting their motivation and engagement. So, I identified my area for further improvement as differentiation.

During a discussion with my mentor, I realised that my surface knowledge of various principles and theories needs to be improved for effective planning and teaching. I recalled the importance of Bruner`s spiral approach (Bruner, 2003). Also discussed Piaget`s theory of cognitive development and

how thinking changes through equilibration (Woolfolk and Kapur, 2019). So, I revisited and re-examined the fundamental ideas of various pedagogical theories to deepen my understanding. Informed by this reading, I came up with the idea of integrating Multiple intelligences (Gardner, 1983) to offer differentiated learning experiences. Thereafter, I made a decision to conduct the multiple intelligence test to know my learners' intelligence profiles, strengths and interests (Appendix 1).

As a part of the inquiry process, to gain deeper insights into my learners' cognitive strengths across different subjects, I planned classroom observations of other lessons. During English class, I came to know the effective use of the RAFT (Role, Audience, Format, Topic) writing strategy and how it significantly impacted my learners' learning. The RAFT writing strategy is a structured approach that helps learners understand their role as a writer, the audience they are addressing, the format of their writing and the topic they are writing about, ultimately improving their writing skills and clarity. I found that the RAFT strategy, typically used in English classes, significantly impacts learner engagement in math by connecting concepts to real-life contexts which helps them to connect easily with Criterion D assessment in the IB curriculum. During our discussion, an English teacher suggested that RAFT will not work effectively for Mathematics. However, I took it as a challenge to implement it successfully in my subject as well. Timetable constraints limited my ability to observe some subjects. So, I took the other teachers' opinions about the learners. The other teachers also shared their inputs about the learners' performance in their respective subjects, which helped me a lot to know more about my learners with respect to proficiency in other subjects. This is the most insightful stage, where I learned to look into various perceptions about my learners and their performances.

During my plan stage, I realised I should use Piaget's cognitive constructivism to test students' readiness. The theory states that each of us constructs meaning from our own experiences as we try to explain to ourselves what we perceive. It will give clarity on how to differentiate individuals based on how they process the information in their brains. I planned a Read – List – Jot activity based on this theory. In this activity, the learners will read the learning outcomes, list the vocabulary which they know and jot down their understanding in different forms. This activated their readiness to learn. "Our own experiences" in his definition – own experiences may sometimes come by social interaction as we are social animals – not all the time experiencing alone. So, in my opinion, Vygotsky's social constructivism and Piaget's cognitive constructivism might not be different because cognitive and social constructivism is to think of knowledge as both individually constructed and socially mediated as per their interests (Woolfolk and Kapur, 2019).

We come across many principles and theories. It's not mandatory to follow them as-is. We can tailor the theories as per our situation – like, I planned to implement the RAFT strategy though the English teacher said it is not suitable for Mathematics. Likewise, we may disagree with some ideologies of great psychologists. Earlier I used to agree with Carlo and Tomlinson's statement that differentiation should not be done daily as it destroys the sense of wholeness in the class (Tomlinson, 1999). But each day, the learners will learn new concepts and how they learn is different from each other. During my practitioner inquiry process, I applied the concept of Gardner's multiple intelligence to differentiate (Gardner, 1983). Gardner's **Theory of Multiple Intelligences** (1983) proposes that

intelligence is not a single general ability, but a combination of different modalities through which individuals learn and express understanding. He identified **eight intelligences**:

1. **Linguistic** – sensitivity to spoken and written language
  2. **Logical-mathematical** – capacity for inductive and deductive reasoning, problem-solving
  3. **Spatial** – ability to visualise and manipulate space
  4. **Bodily-kinaesthetic** – control of one’s body for expression or goal-directed activity
  5. **Musical** – skill in performance, composition, and appreciation of musical patterns
  6. **Interpersonal** – capacity to understand and interact with others
  7. **Intrapersonal** – understanding of self and emotions
  8. **Naturalistic** – sensitivity to nature and patterns in the natural world
- Gardner argued that education should account for these varied forms of intelligence, allowing students to engage with content through their strengths.

At that point, an idea emerged in my mind that, though all the learners’ learning levels in the class may be the same still, there is a need for differentiation in our planning as each learner is unique in conceptualising the concept as per their interests.

The theory of Multiple Intelligences (Gardner, 1983) has been influential in shaping classroom practice. But, it is important to acknowledge that both have been subject to substantial critique within the academic community. Critics have raised concerns about the limited empirical evidence supporting the practical effectiveness of tailoring instruction to individual intelligences. Common methodological concerns include the absence of rigorous control groups, insufficient sample sizes, and a lack of clarity regarding intervention protocols. Moreover, the assumption that aligning instruction with an individual’s preferred ‘intelligence’ or ‘learning style’ leads to improved performance is not consistently supported by research. Despite their intuitive appeal and potential value in promoting diverse and inclusive pedagogical strategies, it is essential to approach these theories with a critical lens. **In this inquiry, the use of Multiple Intelligences serves as a reflective and exploratory framework rather than an endorsement of its scientific validity, and its use was intended to stimulate professional dialogue around differentiated instruction.**

Additionally, Hattie’s research on Visible Learning helped me refine how I measured the effectiveness of differentiation. His framework emphasizes that learner engagement is maximized when learning intentions and success criteria are explicitly communicated (Hattie & Yates, 2013). This aligned with my reflections on assessment culture, where learners often measured success solely in terms of grades, rather than as a process of metacognitive growth and deep learning. To counteract this, I integrated self-assessment tools where learners regularly reflected on how their chosen

differentiation pathways influenced their understanding (Appendix 3, Artefact 2 student feedback form).

The inquiry also led me to Brookfield's Four Lenses of Critical Reflection (Brookfield, 2017), which helped me analyse my own biases in differentiation. I realised that some of my earlier differentiation strategies were too structured, leaving little room for learner agency. Incorporating feedback from learners, colleagues and my mentor, I adjusted my instructional design to encourage learners' choice and ownership over their learning. This shift empowered learners to engage deeply with mathematical concepts through multiple entry points, leading to higher-order thinking, metacognitive awareness and increased autonomy in learning.

## Questions, Aims and Expectations

My inquiry started with the question: How might I accommodate the learning needs of all my learners by using the idea of multiple intelligences as a guide to differentiate instructions?

Instead of relying on **ability-based differentiation**, I aimed to embed **choice-based learning pathways**, allowing learners to engage with content through their **preferred learning type** rather than a **fixed grouping structure**.

I expected change by shifting from teacher-led instruction to student-driven learning, where differentiation was an integral part of the lesson structure rather than an intermittent strategy. Learners chose preferred learning activities – 3D models, real-world applications, or visual explanation – to explore concepts, fostering independence and critical thinking. The anticipated mechanisms included interest-based groupings, personalised task and peer feedback, ensuring collaborative learning and self-regulation. Success was measured through increased engagement, deeper conceptual understanding and a shift in learner perception of differentiation as a personalised learning process.

## Inquiry Plan and Activities

To systematically investigate, I used the following research tools:

### 1. Lesson Plan and Pre-Observation Discussion

- Before the lesson, I discussed the structure of the lesson with my mentor to clarify the key focus areas related to my inquiry question.
- This collaborative discussion helped refine MI-based differentiation strategies and set clear success criteria (based on the Multiple intelligence test which was conducted before the discussion).

#### *Planned Activity: Read–List–Jot*

To activate learners' prior knowledge and ensure a meaningful connection with the new topic, I planned a Read–List–Jot activity as the starter of the lesson. The objective was to assess learners'

existing understanding, help them process information effectively and create a foundation for new learning.

- Read – Learners read the learning outcomes, stated in simple, accessible language to ensure clarity for all learners.
- List – They listed key vocabulary from the previous lesson, linking it to the learning outcomes.
- Jot – Learners chose a preferred mode of expression to demonstrate their understanding by either drawing, writing, animating, or modelling key vocabulary concepts.

### ***Planned Activity: Three-Stage activity***

To foster independent learning and critical thinking, I structured the lesson using a Three-Stage activity: Induction, Process and Marketing. This approach ensured a gradual progression from exploration to problem-solving to peer interaction, aligning differentiation strategies with Multiple Intelligences (MI) to accommodate diverse learning preferences.

- Induction Stage – Learners engaged in visual, kinaesthetic, and verbal representation of concepts through differentiated tasks:
  - Draw and label
  - Make and label a model
  - Animate and label
  - Label on a readymade model
- Process Stage – Learners applied their understanding by solving problems step by step, reinforcing structured thinking and procedural fluency. This stage provided additional support material presented in multiple formats, ensuring accessibility for different learners.
- Marketing Stage – Learners explained their answers to peers, enhancing their communication skills while reinforcing conceptual understanding. This stage promoted peer-to-peer learning, allowing learners to analyse, justify and refine their reasoning based on feedback.

By breaking the learning process into incremental steps, learners had the opportunity to organise information effectively and engage in active problem-solving.

### ***Planned Activity: RAFT Strategy***

To integrate real-world applications into mathematics and encourage interest-based differentiation, I designed a RAFT (Role–Audience–Format–Topic) task that allowed learners to apply mathematical concepts in meaningful contexts. This approach enabled learners to imagine themselves in various roles, fostering engagement, creativity and deeper conceptual understanding.

- Role: Learners assumed roles such as architects, packaging designers and engineers, connecting their learning to practical applications.
- Audience: They presented their findings to clients, manufacturers, or stakeholders, reinforcing the importance of mathematical reasoning in decision-making.

- Format: Learners expressed their understanding through models, blueprints, advertisements, or technical reports, aligning with their cognitive strengths.
- Topic: The focus was on calculating and optimizing the surface area of a rectangular prism in a real-world scenario.

To promote effective collaboration, I paired learners based on common interests in the Role and Format categories, ensuring high engagement and productive teamwork. By embedding differentiation into both content and learner collaboration, the RAFT task encouraged learners to think critically, justify their reasoning and connect mathematics to real-world scenarios.

(Appendix 2: Lesson Resources)

## **2. Observation and Post-Observation Discussion**

- The lesson was observed by my mentor, who provided feedback on learner engagement, effectiveness of differentiation and peer interactions.
- A post-lesson discussion was conducted to analyse the effectiveness of differentiation strategies and the skills I developed in relation to my research focus.

## **3. Student Feedback Forms (Quantitative and Qualitative)**

- A questionnaire-based feedback form was used, consisting of Likert-scale questions followed by open-ended responses.
- Quantitative questions measured learners' engagement and confidence in using differentiated learning strategies.
- Qualitative responses allowed learners to justify their ratings, providing deeper insights into what aspects of differentiation were most effective (Appendix 3: Artefacts).

## **4. Student Work Analysis (Worksheets, GeoGebra Models and RAFT Assignments)**

- Prior Knowledge Test (Read–List–Jot): Used to assess learners' baseline understanding and help them organise their thoughts before engaging with the lesson.
- Three-Stage Strategy (Induction–Process–Marketing): Evaluated how learners applied differentiation strategies in structured learning stages.
- RAFT Task (Role–Audience–Format–Topic): Assessed how learners applied mathematical concepts in real-world contexts, considering their learning preferences and cognitive strengths (Appendix 3: Artefacts).

## **5. Collaborative Learning Reflections**

- I engaged in collaborative discussions with colleagues, sharing my findings and refining differentiation strategies.

- These discussions helped me revisit key theories (e.g., MI Theory, Differentiated Instruction, Practitioner Inquiry) in different contexts, leading to deeper professional insights.

**Table 1: Summary of Research Tools and Their Purpose**

Research Tool	Purpose	Implementation
Lesson Plan & Pre-Observation Discussion	Refine differentiation strategies	Discussed lesson objectives with mentor
Observation & Post-Observation Discussion	Assess differentiation effectiveness	Mentor provided structured feedback
Student Feedback Forms (Quantitative & Qualitative)	Measure learner engagement & confidence	Likert-scale ratings & open-ended responses
Student Work Analysis (Worksheets, GeoGebra, RAFT)	Evaluate learner understanding	Analysed learner outputs from differentiated tasks
Collaborative Learning Discussions	Refine pedagogical strategies	Shared findings with colleagues & revised approaches

## Ethical considerations and relationships

In addressing ethical issues, it was paramount to ensure informed consent, confidentiality, voluntary participation and avoidance of harm. Participants were provided with clear and comprehensive instructions about how their data would be used. The data collected through RAFT worksheets, feedback forms and observations was anonymised to protect learner identities. Additionally, I ensured that any ideas or resources adapted for my work were properly acknowledged.

Having taught the same group of 12-year-old learners for two years, I was familiar with their learning behaviours and preferences. However, to gain deeper insights into their cognitive strengths across different subjects, I planned classroom observations of other lessons. The other teachers were happy to welcome me to observe their classes for my professional development and had a healthy discussion.

Beyond working directly with learners, I collaborated closely with mentors and coordinators to ensure that all aspects of the research aligned with ethical guidelines. Regular meetings and documentation helped maintain transparency and discussions with colleagues and subject experts allowed me to refine my approach while upholding professional integrity.

Safeguarding policies were strictly followed throughout the study. E-safety measures were implemented to ensure that digital tools such as GeoGebra were used securely and peer collaboration activities, particularly the Market stage of the Three-Stage Strategy, were structured to promote a respectful and inclusive learning environment. By continuously monitoring the research process and making necessary adjustments based on learner and mentor feedback, I ensured that the inquiry remained ethical, transparent and learner centred at all times.

## Findings

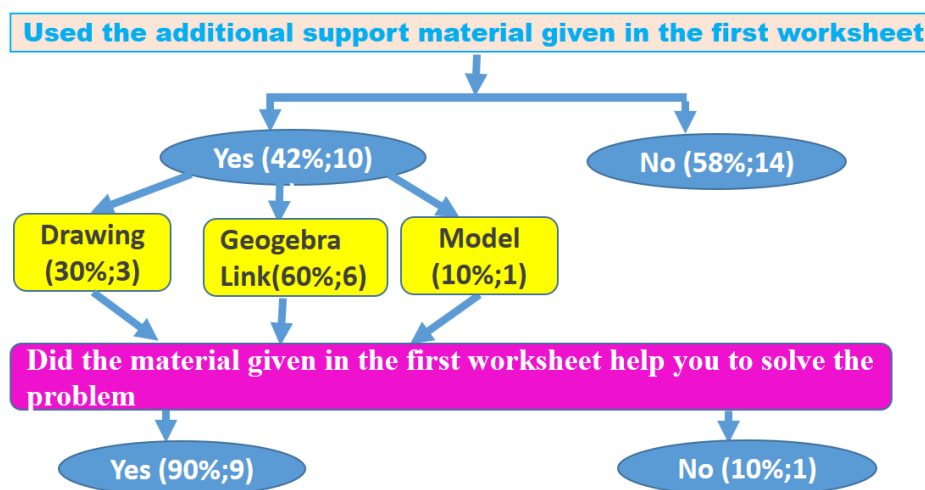
Previously, I was just selecting appropriate strategies and theories suitable to my learners' levels and felt that I implemented them successfully. But during the inquiry process, I became open to accommodate new learning opportunities, which influenced my existing knowledge and beliefs through collaboration. I realised that I could attain even more success if I tailor various strategies and theories on my own and make me a unique teacher with my own principles and strategies. I also experienced that revising the same concept and pedagogical theories in different contexts makes us think differently. This process empowered me to take ownership and confidence on my work to yield better results in my classroom practice which eventually led to the successful learning of my learners.

Learning involves extending knowledge to a new situation. In math, learning is not knowing about computation but using computation as a tool in problem-solving and characterising and understanding structures and patterns. Four perspectives on learning environment – learner-centred, knowledge-centred, assessment-centred and community-centred is essential to achieve this (Bransford, 2004). After assigning the task, I visited the learners to check the effectiveness of the plan in achieving my professional goal and my learners' learning outcomes. I noticed that a few learners stopped writing in front of me as they hesitated to show their thought process to the teacher on the spot, but most of the learners were wholly engaged with the task and learner-centred as it was designed by considering not only their levels but also Gardner's multiple intelligence theory (Gardner, 2011). They were using various resources to solve the task and simultaneously checking each other's work. They were also engaged in peer assessment followed by meaningful and effective feedback.

Through this, I understood that the task I designed followed the four perspectives of the learning environment to a great extent. While reading their feedback forms, I tried to connect their opinions with my observations during the class to validate my observations and their feedback. I also realised that those few learners who hesitated to show their work to me achieved the intended outcomes successfully. I observed this right from the beginning of my career and I put my best efforts to make these kind of learners feel comfortable. However, they have a sort of hesitation. So after this lesson reflection, I started providing the resources based on their needs, levels and multiple intelligence, I will be approachable to them in that way and make their self-learning more meaningful. And once they gain confidence in the subject they can overcome that sort of hesitation over a period of time (Woolfolk and Kapur, 2019).

A well-planned lesson guiding them to reach the intended outcomes and aligned activities enabled the learners' self-regulation and collaboration to promote effective learning. The activity at the prior knowledge level triggered the prior knowledge and motivated them intrinsically because the options were given as per their interests. So, most of the learners connected the prior knowledge with the present content more meaningfully. It was clear to them "where they were going." The Induction – Process – Product – Marketing stage developed their metacognition skills as they became self-regulated (Cambridge-community.org, 2022). They also understood the importance of logical procedures to solve a problem. The figures below based on the data collected from the feedback

form, gave a good understanding of their confidence in achieving the first learning outcome. 58% stated that they were able to solve the worksheet without the support material.



**Figure 1: Analysis on the Usage of the Support Material**

They were able to analyse "how they are going" as they checked each other's work and received a meaningful feedback (both by teacher and peer). And "where to next", they have a keen idea on each stage as they are well connected with the learning outcomes which I shared with them as an activity (Read – List – Jot) in the beginning of the lesson. But as my mentor said, I would have included one high-order thinking question at this level, so it would be a challenge to the average and above-average learners (Hattie and Timperley, 2007).

During the RAFT activity, effective learning through pair collaboration was evident and even the low-ability learners were also actively involved to maximise their learning. This was clearly stated by individual learner in the feedback form for the question "How confident in solving application problems independently?" on a scale of 0 – 10.

**Table 1: Confidence in Solving Application Problems Independently**

Rating	0	1	2	3	4	5	6	7	8	9	10
Frequency	0	0	0	1	0	1	3	3	3	3	10

A review with a group of experts like mentor, CIDTL peers and other teachers with a presentation of the whole practitioner inquiry process, gave powerful insights. After this review, I thought of talking to the learners who needed more confidence to work independently, to know the reason and to plan the relevant strategies to support them. Overall, one learner was unable to achieve the intended learning outcomes successfully because of too many learning gaps with the standards of the present grade. However, as a teacher, I must enable all learners to achieve the intended outcomes. So, I need to work on the strategies to support this kind of learner who needs to improve in basics.

**Table 2: Achievement of the Intended Learning Outcome**

Achievement of the learning outcome	Yes	Partially	No
Frequency	21(88%)	2(8%)	1(4%)

Effective planning is the most important skill I have learned and developed during this process. Based on my assumptions, I was planning the lessons believing that the learners were reading into my actions. I neither examined nor checked whether they were able to follow it or not. At a later stage, I started collecting feedback from my mentor and learners. This feedback helped me tailor my lessons as per my learners` requirements. My opinions and high self-confidence prevented me from analysing the reasons for success and thinking critically and made me biased. But the critical discussion with a group of experts during the review stage in the practitioner inquiry process aided in balancing my emotions when I receive negative and positive feedback.

Understanding the thought processes of the learners is tricky for most teachers, as the perception of grown-ups will be different from the young minds. I had a pre-observation discussion with my mentor about the lesson plan. At that point, neither of us realised to give the formula in the resource sheet as we both were aware of it. But during the execution of the plan, I noticed that the flow got disturbed as a few learners were struggling with the formula and seeking help from the teacher and their peers. So, immediately I wrote the formula on the board. Then, they started working independently. Through this I came to know that a few things might appear simple but could negatively affect the plan. So, as Brookfield said, among four lenses, the learner`s lens is the most important (Brookfield, 2017). Next time onwards I will plan the things from their perspectives by keeping even minor things in mind, so that it will not impact the effective flow of the lesson. I was taking learners` feedback even before the inquiry process, but I was not analysing them very deeply as the feedback was not pinpointed to a specific aspect. However, during the practitioner inquiry process, I learned how to collect quantitative data along with supportive qualitative data (Appendix 3, Artefact 2: Student Feedback Form) to analyse the effectiveness of my teaching and how it impacted my learners` learning in their point of view. It increased authenticity and aided me in further tailoring my teaching-learning strategies as per their requirements (Hattie, 2003).

Learners are valuable evaluators of how teaching impacts their engagement and understanding. However, their feedback may not always reflect the full effectiveness of a lesson, as they may lack the disciplinary background to assess deeper pedagogical goals. For example, in my feedback form, they were able to record how the activities or differentiated resources supported or did not support them to achieve the intended outcomes. But they could not justify whether the given questions developed their critical thinking. Teachers share experiences and analyse them together to learn from each other or find a solution to a problem they are commonly facing. My mentor did not know the levels of my learners, so when she saw my lesson plan, she did not point out the critical questions. However, after observing my class, she realised that the question I gave at the Induction – Process – Product – Marketing stage was insufficient as per their levels. This kind of review will guide teachers not only to

improve their own teaching but sometimes it helps to evaluate the course or entire curriculum depending on the challenges both teachers and learners face.

## Changes to practice

I took several actions based on my observations and findings. First, I engaged in reflective practice using various theories and models, such as Gibb's reflective cycle and Brookfield's four lenses of critical reflection, to evaluate and improve my teaching strategies. I also started collecting feedback from learners after every class to gauge their learning and improve my practice. Additionally, my mentor observed my classes and provided constructive feedback, which I used to refine my teaching strategies. I started conducting the multiple intelligence test once a year to know their interests. I also conducted diagnostic tests at the beginning of each unit to assess learners' levels and abilities, allowing for better differentiation in my teaching. Engaging in discussions with my mentor, peers and other teachers helped me reflect on my practice and gain multiple perspectives. Based on feedback and observations, I tailored my strategies to support all learners, including those needing more confidence and those with learning gaps.

The biggest impact came from the implementation of the RAFT strategy in my mathematics classes. This approach encouraged critical thinking and allowed learners to connect mathematical concepts to real-life contexts, leading to more engaging and meaningful learning experiences. The learners imagined themselves in various roles and started thinking in that perspective. One group imagined themselves as Vincent, a customer and modelled their requirement of a sheet of cover to cover the pile of logs which is in a cuboid shape with pens, pencils and a sheet of paper available at that moment (Appendix 3, Artefact 1 student work). Additionally, collecting and analysing feedback from learners (Appendix 3, Artefact 2 student feedback form) and mentor provided valuable insights that helped me refine my teaching strategies. A few learners gave a rating of 9 and 10 with an explanation that imagining themselves in a character and solving a sum with a proper representation which they like, enabled their application skills. Also they stated that it was fun doing math in that way. I continued to collect evidence. Thereafter, I started planning my lessons on real life situations more meaningfully. I also started collecting and analysing both quantitative and qualitative data from feedback forms to assess the impact of my teaching on learners' learning.

The implications of my findings are significant for other education practitioners. My study highlights the importance of reflective practice in teaching. Teachers can use reflective models like Gibb's cycle and Brookfield's lenses to critically evaluate and improve their practice. Collecting and analysing feedback from learners and mentors is crucial for refining teaching strategies and ensuring they meet learners' needs. Conducting multiple intelligence test, diagnostic tests and tailoring teaching strategies based on learners' levels and interests can significantly enhance learning outcomes.

The successful implementation of the RAFT strategy in mathematics demonstrates that innovative teaching strategies can be adapted across subjects to promote critical thinking and engagement. Engaging in collaborative reflection with peers and mentors provides diverse perspectives that can help teachers identify areas for improvement and develop more effective

teaching practices. Customizing pedagogical theories and strategies to fit specific classroom contexts and learners' needs can lead to more effective and meaningful teaching and learning experiences.

Other education practitioners can find my study useful as it provides practical insights and examples of how reflective practice, feedback, differentiation, and innovative teaching strategies can be applied to improve teaching and learning outcomes.

## Reflective evaluation on the process

What worked particularly well was how Multiple Intelligences based differentiation was seamlessly integrated into lesson design rather than being treated as an add-on. The progressive structuring of differentiation strategies, from initial multiple intelligence test and diagnostic assessments to learner-driven learning tasks, created a cohesive flow that encouraged engagement and autonomy. I was pleasantly surprised by learners' participation in unconventional differentiation approaches, such as peer explanations during the Market stage and the RAFT strategy adapted for mathematics.

A significant supportive condition for success was ongoing mentorship and structured feedback mechanisms. Discussions with my mentor helped refine lesson design and assessment strategies, while learners' reflections provided valuable insights into how differentiation impacted engagement. The school's openness to innovative teaching practices also facilitated this inquiry, allowing room for experimentation and adaptation.

However, there were also challenges in conducting the inquiry. Time constraints limited my ability to conduct extended classroom observations across different subjects, which might have provided a broader perspective on learners' learning behaviours. The process of developing my practice required me to critically evaluate my assumptions about differentiation. I had approached differentiation primarily through ability grouping, but findings from lesson observations and learner feedback made me shift towards a more flexible, intelligence-driven approach. This posed challenges in lesson planning, as I had to ensure that differentiation remained structured while allowing for learner choice. The biggest realisation was that differentiation must be both systematic and adaptable, meaning learners need guidance in making informed learning choices rather than simply being given options.

One disappointment was realizing that my initial feedback collection methods were not specific as they were the strategies like rating scales and thumbs up – thumbs down etc. They were not enough to provide actionable insights as the justification of the learners' rating was missing. That did not yield the detailed information to make precise improvements. After this research process, I reflected that I may use these simple feedback strategies on regular basis as taking such a detailed feedback daily is not possible because of time constraint. But, I need to collect the precise and detailed feedback (both qualitative and quantitative) with proper justification after the completion of a concept in a unit to analyse the process critically.

Developing my practice and thinking posed several challenges. One major challenge was overcoming personal biases and assumptions about my teaching effectiveness. It required a shift from a more confident, self-assured approach to a more humble, reflective stance. Another challenge was the need to adapt and tailor various pedagogical theories to fit the specific context of my classroom, which required ongoing experimentation and flexibility. Balancing the desire to implement innovative strategies with the need to ensure that all learners were meeting learning outcomes was also a significant challenge.

The entire process of systematically collecting and analysing feedback from learners was new for me. While I had always sought to improve my teaching, the structured and ongoing nature of this feedback collection, combined with reflective practices, was a new approach.

If I were to redo this inquiry, I would consider focusing specific lessons on individual MI-based differentiation strategies, gradually distributing different learning approaches across a unit to assess their long-term impact on engagement and conceptual understanding. This would allow for a more detailed analysis of which intelligence-based strategies are most effective for different learners.

My advice to others conducting a similar inquiry is to engage deeply with research while continuously reflecting on classroom practice. They should embrace experimentation, viewing learning as a dynamic, evolving process rather than a fixed set of methods (Kolb, 1984). Additionally, it is crucial to involve learners in the differentiation process, helping them understand why different strategies are used and how they can leverage their strengths. This mind-set shift is essential for creating learner-centred, differentiated instruction that fosters autonomy and deep engagement.

Overall this inquiry has reaffirmed the value of differentiated instruction in promoting learner engagement; however, it has also highlighted the importance of applying educational theories with a critical mind set. While frameworks such as Multiple Intelligences offer practical tools for reflection and planning, their use must be informed by an awareness of their empirical limitations. Going forward, I aim to balance such pedagogical models with evidence-based strategies to ensure both inclusivity and academic rigour in my practice.

## Next steps

I plan upcoming units by integrating insights from Understanding by Design and reflections from the inquiry process. My approach begins with designing tasks that assess higher-order cognitive processes, ensuring learners apply their learning rather than merely recalling concepts.

To support this, I break down lessons by aligning standards, content, skills and knowledge while considering learners' interests, abilities and backgrounds. This ensures an inclusive, well-structured lesson plan where no child is left behind.

Next, I focus on sequencing lessons to provide effective scaffolding, integrating learning environments that promote high-order thinking. Activities and experiences are aligned with the objectives to deepen understanding.

I also prioritise learner feedback, recognising its role in refining my teaching strategies. Through continuous reflection and adjustments—especially during term breaks—I ensure lessons remain dynamic and responsive to learners' evolving needs.

## Supplementary materials / resources

**Appendix 1:** Multiple intelligence record sheet of a learner

**Appendix 2:** Lesson Resources:

- (a) Lesson Plan
- (b) Presentation
- (c) Worksheet 1
- (d) Worksheet 2
- (e) Feedback Form and Lesson Activity Review

**Appendix 3:** Artefacts:

- Student Work
- Student Feedback Forms

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Camtree: the Cambridge Teacher Research Exchange is a global platform for close-to-practice research in education. Based at Hughes Hall, University of Cambridge, Camtree draws on high-quality research from around the world to support educators to reflect on their practice and carry out inquiries to improve learning in their own classrooms and organisations. The outcomes of these inquiries, once peer reviewed, can be published within the Camtree digital library under a Creative Commons Licence (CC-BY 4.0). You can find out more about Camtree and its digital library at <https://www.camtree.org>.