Introducing the new technologies in the Classroom: Is that a way to achieve "Active Learning"? Lets see deeper into curriculum development for the Gifted Students

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Abstract

Use of new techniques in the classroom is vital because of their powerful impact upon students' learning. For example, several studies have shown that students prefer strategies promoting active learning to traditional lectures. Other research studies evaluating students' achievement have demonstrated that many strategies promoting active learning are comparable to lectures in promoting the mastery of content but superior to lectures in promoting the development of students' skills in thinking and writing. Further, some cognitive research has shown that a significant number of individuals have learning styles best served by pedagogical techniques other than lecturing. Therefore, a thoughtful and scholarly approach to skillful teaching requires that faculty become knowledgeable about the many ways strategies promoting active learning have been successfully used across the disciplines. Further, each faculty member should engage in self-reflection, exploring his or her personal willingness to experiment with alternative approaches to instruction. Several additional strategies promoting active learning have been similarly shown to influence favorably students' attitudes and achievement. Visual-based instruction, for example, can provide a helpful focal point for other interactive techniques. In-class writing across the disciplines is another productive way to involve students in doing things and thinking about the things they are doing. Two popular instructional strategies based on problem-solving model include the case study method of instruction and guided design. Other active learning pedagogies worthy of instructors' use include cooperative learning, debates, drama, role playing and simulation, and peer teaching. In short, the published literature on alternatives to traditional classroom presentations provides a rich menu of different approaches faculty can readily add to their repertoire of instructional skills. Currently, most published articles on active learning have been descriptive accounts rather than empirical investigations, many are out of date, either chronologically or methodologically, and a large number of important conceptual issues have never been explored. New qualitative and quantitative research should examine strategies that enhance students' learning from presentations; explore the impact of previously

overlooked, yet educationally significant, characteristics of students, such as gender, different learning styles, or stage of intellectual development; and be disseminated in journals widely read by faculty. Therefore, curriculum designers need to look for ways of linking subject-matter to students own experience, and concentrate on the developmental structure of the subject-matter (that is, the sequence in which the subject-matter is most easily and naturally learned).

Keywords: Curriculum design, gifted students, new technologies, enhanced motivation, integrated curriculum, visual literacy, QR codes.

1. Introduction

Let's imagine the following scenario:

Mustafa, a 16-year-old college boy, woke up early Friday morning to download this week's History pod cast to his iPod. As he got into his car for the one-hour commute to campus, he put on his ear buds and began to listen to his professor's test review session. The lecture ended as he entered the student parking lot. Before exiting the car, Mustafa received a text message on his smart phone from Lian; his study partner just arrived from *China. She had some questions and wanted to meet up with him in the library before the* test. He pulled out his laptop and backpack before locking the car door. By the time he reached the library, Lian was already connected and online at her favourite table. She was busily transferring the professor's lecture notes from the course Web site to her pen drive. "What's the answer to question number three?" she asked as Mustafa sat down. "I don't know," he answered; "Why don't you Google it to find out?" "I've got a better idea," she responded. "Why don't you IM the professor? He's online right now." Professor Davis was on his way back to his office from Media Services when a familiar chime let him know that someone was IMing him. He pulled out his PDA and read the message. With stylus in hand, he typed the response, "Call me." Ten seconds later, his cell phone rang. "Hello?" "Hi, Dr. Davis. Mustafa and I are in the library and we are having a hard time answering question number three." "Are you in front of your computer?" Dr. Davis asked. "Yes, we are." "Go to this week's lecture notes and review the section on Western Expansion. You'll find what you are looking for there." "Thanks a lot," Lian answered. "We'll see you in class."

Often, educators' use of the term "active learning" has relied more on intuitive understanding than a common definition. Consequently, many faculties assert that all learning is inherently active and that students are therefore actively involved while listening to formal presentations in the classroom. Analysis of the research literature (Chickering and Gamson 1987), however, suggests that students must do more than just listen: They must read, write, discuss, or be engaged in solving problems. Most important, to be actively involved, students must engage in such higher-order thinking tasks as analysis, synthesis, and evaluation. Use of these techniques in the classroom is vital because of their powerful impact upon students' learning. For example, several studies have shown that students prefer strategies promoting active learning to traditional lectures. Other research studies evaluating students' achievement have demonstrated that many strategies promoting active learning are comparable to lectures in promoting the mastery of content but superior to lectures in promoting the development of students' skills in thinking and writing. Further, some cognitive research has shown that a significant number of individuals have learning styles best served by pedagogical techniques other than lecturing. Therefore, a thoughtful and scholarly approach to skillful teaching requires that faculty become knowledgeable about the many ways strategies promoting active learning have been successfully used across the disciplines. Further, each faculty member should engage in self-reflection, exploring his or her personal willingness to experiment with alternative approaches to instruction.

2. Today's classes are multicultural

Wherever one looks, evidence of mobile penetration is irrefutable: cell phones, PDAs, MP3 players, portable game devices, handhelds, tablets, and laptops abound. No demographic is immune from this phenomenon. From toddlers to seniors, people are increasingly connected and are digitally communicating with each other in ways that would have been impossible only a few years ago. Consequently, it comes as no surprise that sooner or later people would begin to look for ways to integrate mobile computing into e-learning to make courses more accessible and portable. Personal digital assistants (PDAs) are also seeing more use in the classroom. New educational software programs (such as quizzing and trivia programs, along with grade- and assignment-tracking tools) show great benefits for both students and teachers. The increase in use is attributed to the affordability and portability that PDAs offer, making it possible for each student to have access to a computer at any time and any place. No longer dependent on computer labs for computing capability, students can work on PDAs right at their desks. Students can also take PDAs on field trips to collect, store, and analyze data on site. As the market for portable computing devices continues to expand, e-books are predicted to grow with them. In response, online bookstores have increased their holdings of e-books, with some publishers now including e-book versions of their printed college textbooks. Currently, companies are working on adding audio, video, and text-to-speech components for ebook software, which might—along with new usability standards—eliminate the barriers to their widespread adoption within the next few years. Portable computing/communication devices such as laptops, PDAs, and smart phones connected to wireless networks enable mobility and facilitate mobile learning. Mobility allows teaching and learning to extend beyond the traditional classroom; in the case of distance learning, users of portable devices can break the tether of the home computer. Within the classroom, portable computing/communication devices give instructors and students increased flexibility and provide new opportunities for interaction. Mobile technologies also support learning experiences that are collaborative, accessible, and integrated with the world beyond the classroom.

3. Digital Literacy across the Curriculum.

Enrolment and achievement data frequently show an overrepresentation of migrant and ethnic minority groups in educational institutions with lower academic demands, an

overrepresentation in special education, as well as disproportional early dropout and expulsion rates. Given the lack of research in this area, it is rather difficult to assess the extent to which educational underachievement of migrants and ethnic minority groups can be traced back to forms of discrimination. Many factors influence their educational attainment, e.g. language competency, socio-economic factors, parents' educational background, and cultural values. Still, among signs of discriminatory attitudes and practices are that minority students are faced with low teacher expectations, assignment to special education for reasons other than disability, placement in lower than ageappropriate grades, and restricted admittance into more prestigious or private institutions. In addition, disadvantages exist when there is a lack of or low quality of compensatory programs, a lack of effective language programs and of specifically trained language teachers, a lack of intercultural curricula and minority education programs as well as a lack of religious pluralism. Differentiated data shows that great differences exist in achievements between various migrant and ethnic minority groups. While some ethnic groups achieve significantly above average results or even outperform majority students on some educational levels, others are very much behind.

PISA study results of students' reading, mathematical and scientific literacy skills show that in most countries, native students perform better than students with a foreign background (born in the country or abroad). Reports on non-migrant ethnic minority groups (national, autochthonous or linguistic minorities) show underachievement in education of several groups, among them Roma (and Sinti) in several countries, or the Muslim minority in Greece. The reasons for the lower academic achievement of these groups vary and are manifold. Overall, there is a lack of research and data concerning the reasons for the educational underachievement of non-migrant ethnic minority groups. It seems fair to say that in many cases, a history of social exclusion, assimilationist tendencies, and a monocultural orientation in education lead to distrust in the educational system and to low expectations about the benefits of educational attainment. Since a large proportion of the groups' older generation has not met basic educational standards, it has been problematic to increase the educational attainment of the younger generation. Some consider schooling of their children even as harmful since, in their view, it deprives children of their family and socializes them into different cultural values and norms. Most basic cell phones today can send and receive text messages, voicemail, and e-mail. Email is a convenient way to communicate information to the learning community, so the instructor can begin by sending class-wide "broadcast" e-mails that students can access via a variety of mobile devices.

With the challenge of new mobile technologies for podcasting comes a great opportunity for providing new types of services for traditional and distant learners. The potential offered by podcasting makes it worth the effort of learning and using. The implications of mobile learning are far-reaching, and its potential effect on education profound. The next few years will see a period of rapid growth for mobile learning, with evolutionary rather than revolutionary changes. Mobile learning capabilities will continue to expand with the introduction of smaller, more sophisticated and powerful gadgets capable of delivering data in a variety of formats anywhere, at any time. Today's mobile computing devices have more computational power than the largest computers of a generation ago, and this trend continues. Whether mobile learning will be adopted by faculty and students will depend to a great extent on how efficient and necessary they consider the services and features. For example, if students like to be informed via SMS every time a new message is posted on the announcements pages of their online courses, they would likely subscribe to such a service if it were offered as an option. By the same token, if faculty could easily facilitate their online courses and respond to individual student queries while travelling, many would gladly take advantage of it. This – with no doubt – facilitates the use of language and reduces the barriers between the different language students. Most of the immigrant students today can communicate in English; even if the level of language achievement is not so high, this enables them to participate in the digital class.

4. Can we incorporate Active Learning in the classroom?

The modification of traditional lectures (Penner 1984) is one way to incorporate active learning in the classroom. Research has demonstrated, for example, that if a faculty member allows students to consolidate their notes by pausing three times for two minutes each during a lecture, students will learn significantly more information (Ruhl, Hughes, and Schloss 1987). Two other simple yet effective ways to involve students during a lecture are to insert brief demonstrations or short, ungraded writing exercises followed by class discussion. Certain alternatives to the lecture format further increase student level of engagement: (1) the feedback lecture, which consists of two minilectures separated by a small-group study session built around a study guide, and (2) the guided lecture, in which students listen to a 20- to 30-minute presentation without taking notes, followed by their writing for five minutes what they remember and spending the remainder of the class period in small groups clarifying and elaborating the material.

Recently, a new idea comes on: the educational use of QR Codes. A quick response (QR) code is a two dimension bar code that can be read on devices such as a mobile device (camera phone) or a laptop computer which, once accessed, will allow you to complete an action. For instance, reading some text, accessing a web site or texting a number. As an illustration the QR code opposite will open a web page. A useful way of thinking of QR codes is that they link the physical world (the poster, print out, room, or physical object) to the electronic (web resource, text information) or facilitating communication (SMS message, phone call). This adds value through improving the potential of making access to information more efficient and effective. What tasks can be completed through a QR code? Technology QR codes are evolving rapidly. This is evident from the increasing number of activities that can be achieved using a QR code. However, in the context of this introduction there are four core content types or actions associated with QR codes. As mobile learning and technology is more readily integrated within classroom settings, QR codes can be used as an interesting method to capture a student's attention and make lesson material more interactive. Quick response codes, also known as 'QR' codes, are simple, scannable images that are a form of barcode. By scanning a QR code image through a mobile device, information can be accessed including text, links, bookmarks and email addresses. In the classroom, QR codes can be used in a variety of ways — from conducting treasure hunts to creating modern CVs. One of the most effective ways the QR code could be used is in mail order catalogs. In the catalog it

would have information on each of the products, pictures and then a QR code with a call to action to scan it. When scanned, the code would pull up a promotional video that explains the product further and shows examples of the product being used. When the video finishes, it will prompt the user to directly add the item to their shopping cart. Additionally, because the catalog could have the QR code link to a URL of their choice, they can track all scans and conversions to measure effectiveness and make necessary changes. Other ways to use QR Codes:

- to assign homework assignments
- to Link to Important Forms
- to Give Feedback
- for Polls, Surveys, etc

In adult education, QR Codes may be used for examinations, certification and many other applications. Because of their unusual design, the QR codes would certainly draw the viewers eye, the problem is, these codes are meant to be viewed (primarily but not exclusively) on a mobile phone. If they have a PDF to fill out, it would be much easier to download it to a computer than a mobile phone.

4.1. Visual Literacy across the Curriculum

Learning science, technology, social studies, health and nutrition, history and geography, mathematics, arts and crafts all rely on visual texts such as maps, diagrams, graphs, timelines or tables.

• Visualizing is thinking

Drawing information, as a diagram, map or table, helps children to see how facts are connected, whereas "making notes" often provides only a collection of isolated pieces of data. Visual texts do some things better than verbal texts; verbal texts do some things better than visual texts. Verbal texts (texts made of words and sentences) are ideal for recording details and examples. Visual texts tend to simplify and generalize a topic and may omit minor details. But they are best at capturing the connections between the key details and show the structure or organizing principle of a topic.

• Re-composing helps understanding

"Re-composing" means reading information in one form (such as words and sentences) and summarizing it in another form (such as a diagram or table). If you ask students to recompose the information, they can no longer simply copy their source. They need to think about what a paragraph means before they can summarize it as a visual text. Recomposing is a key strategy in aiding comprehension.

• Visual texts are graphic organizers

- 1. Visual texts, such as flow charts and tree diagrams, are ideal for providing a framework for writing.
- 2. Information report: use a table or tree diagram to organize the order of the paragraphs ("Which comes first? What goes next?").
- 3. Recount: recall the key events along a timeline before starting to write.
- 4. Explanation: use a flow chart to sequence the steps in an explanation.
- 5. Procedure (instructions): organize the steps in the right order using a timeline or flow chart.
- 6. Argument (persuasion) : use a flow chart to sequence in the best order all the reasons for a point of view
- 7. Discussion: draw up a table of reasons "for" and "against" before making a decision about which side of a discussion you support

Most young readers can interpret ("read") diagrams and maps long before they can read the same information in words and sentences. Support their reading with nonfiction books that cue the unfamiliar words with clear diagrams, not just photographs.

- Reading and writing
 - 1. Use a diagram ("picture glossary") to provide key vocabulary when introducing unfamiliar or "technical" language.
 - 2. Flow charts, timelines and tables can help students to plan an essay (such as explanations, recounts, reports).
 - 3. Sometimes it is more helpful to summarize a text as a diagram or a table, instead of writing disconnected "notes".
- Science and technology
 - 1. Many scientific concepts are more clearly grasped when visualized as a visual text, such as a cross section (for example to explain how we breathe) or flow chart (to show an animal's life cycle).
 - 2. Relationships in nature can also be summarized as a web diagram (such as a food web) or flow chart (such as the water cycle).
 - 3. Step-by-step procedures ("how to...") can be followed more easily when arranged as a flow chart, storyboard, or timeline.
- Social studies
 - 1. Social relationships can be understood quickly if you sometimes use a web diagram (sometimes called a sociogram) or a tree diagram.
 - 2. Flow charts are useful in explaining topics such as recycling, habitats, interdependence and responsibilities.
- History
 - 1. Use timelines to summarize sequences of events
 - 2. Flow maps (maps with arrows showing journeys) help children to visualize exploration and migration themes
 - 3. Changes over time, causes of key events, and sequencing of events can be shown clearly using flow charts
 - 4. Line graphs help visualize economic and other changes over time
- Geography

- 1. Graphs (line, bar, and pie) help students to grasp concepts such as climate, population change, and public opinion
- 2. Flow charts help visualize topics such as the water cycle, climate change, globalization, and Earth processes
- 3. Maps can be used to visualize political states, climate, vegetation, wealth and poverty, trade, war, and so on.
- Mathematics
 - 1. Young children can benefit from visualizing addition and subtraction using simple bar graphs.
 - 2. Spatial concepts are best shown in maps and diagrams.
 - 3. Some children can interpret problems more successfully if they are encouraged to visualize the key elements in a map or diagram.
 - 4. Graphing assists work in measurement and recording of data.

Discussion in class is one of the most common strategies promoting active learning with good reason. If the objectives of a course are to promote long-term retention of information, to motivate students toward further learning, to allow students to apply information in new settings, or to develop students' thinking skills, then discussion is preferable to lecture (Mc Keachie et al. 1986). Research has suggested, however, that to achieve these goals faculty must be knowledgeable of alternative techniques and strategies for questioning and discussion (Hyman 1980) and must create a supportive intellectual and emotional environment that encourages students to take risks (Lowman 1984). Several additional strategies promoting active learning have been similarly shown to influence favorably students' attitudes and achievement. Visual-based instruction, for example, can provide a helpful focal point for other interactive techniques. In-class writing across the disciplines is another productive way to involve students in doing things and thinking about the things they are doing. Other active learning pedagogies worthy of instructors' use include cooperative learning, debates, drama, role playing and simulation, and peer teaching. In short, the published literature on alternatives to traditional classroom presentations provides a rich menu of different approaches faculty can readily add to their repertoire of instructional skills. Academic administrators can help these initiatives by recognizing and rewarding excellent teaching in general and the adoption of instructional innovations in particular. Comprehensive programs to demonstrate this type of administrative commitment (Cochran 1989) should address institutional employment policies and practices, the allocation of adequate resources for instructional development, and the development of strategic administrative action plans. Equally important is the need for more rigorous research to provide a scientific foundation to guide future practices in the classroom. New qualitative and quantitative research should examine strategies that enhance students' learning from presentations; explore the impact of previously overlooked, yet educationally significant, characteristics of students, such as gender, different learning styles, or stage of intellectual development; and be disseminated in journals widely read by faculty. In retrospect, it appears that previous classroom initiatives and written materials about active learning have all too often been isolated and fragmented. The resulting pedagogical efforts have therefore lacked coherence, and the goal of interactive classrooms has remained unfulfilled.

5. What Is Integrated Curriculum for the Gifted Students?

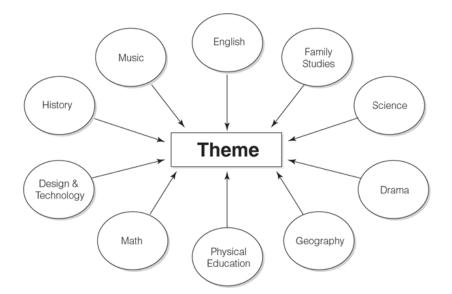
5.1. Defining Integrated Curriculum

Innovative educators concerned with improving student achievement are seeking ways to create rigorous, relevant, and engaging curriculum. Teachers maintain accountability while designing learning experiences that are relevant to student interests. Interestingly, two of the schools serve populations of diverse students. In each case, teachers have developed intriguing curriculum that pushes beyond the boundaries of traditional disciplines to produce positive results. Comprehension, for example, is comprehension, whether taught in a language class or a science class. When students are engaged in learning, whether they are taking part in the arts or role playing in a microsociety, they do well in seemingly unconnected academic arenas. These are only a few of the countless examples of students involved in interdisciplinary studies at all grade levels. The examples highlight the potential of integrated curriculum to act as a bridge to increased student achievement and engaging, relevant curriculum. Defining integrated curriculum has been a topic of discussion since the turn of the 20th century. Over the last hundred years, theorists offered three basic categories for interdisciplinary work; they defined the categories similarly, although the categories often had different names. Integration seemed to be a matter of degree and method.

5.2. Multidisciplinary Integration

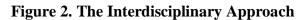
Multidisciplinary approaches focus primarily on the disciplines. Teachers who use this approach organize standards from the disciplines around a theme. Figure 1 shows the relationship of different subjects to each other and to a common theme. There are many different ways to create multidisciplinary curriculum, and they tend to differ in the level of intensity of the integration effort. The following descriptions outline different approaches to the multidisciplinary perspective.

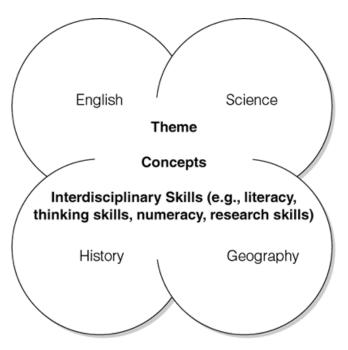
Figure 1 The Multidisciplinary Approach



5.3. Interdisciplinary Integration

In this approach to integration, teachers organize the curriculum around common learnings across disciplines. They chunk together the common learnings embedded in the disciplines to emphasize interdisciplinary skills and concepts. The disciplines are identifiable, but they assume less importance than in the multidisciplinary approach. Figure 2 illustrates the interdisciplinary approach.



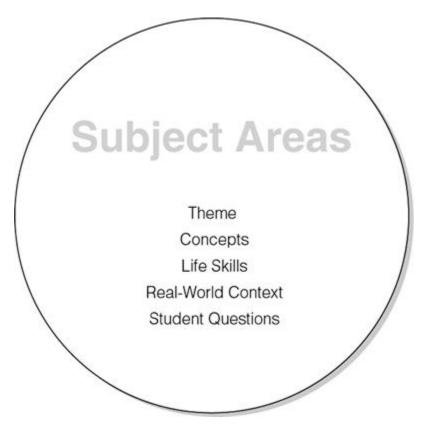


Teachers integrate computer use into the curriculum, rather than adapting curriculum to the use of computers.

5.4. Transdisciplinary Integration

In the transdisciplinary approach to integration, teachers organize curriculum around student questions and concerns (Figure 3). Students develop life skills as they apply interdisciplinary and disciplinary skills in a real-life context. Two routes lead to transdisciplinary integration: project-based learning and negotiating the curriculum.





In project-based learning, students tackle a local problem. Some schools call this problem-based learning or place-based learning. According to Chard (1998), planning project-based curriculum involves three steps:

- 1. Teachers and students select a topic of study based on student interests, curriculum standards, and local resources.
- 2. The teacher finds out what the students already know and helps them generate questions to explore. The teacher also provides resources for students and opportunities to work in the field.
- 3. Students share their work with others in a culminating activity. Students display the results of their exploration and review and evaluate the project.

Studies of project-based programs show that students go far beyond the minimum effort, make connections among different subject areas to answer open-ended questions, retain what they have learned, apply learning to real-life problems, have fewer discipline

problems, and have lower absenteeism (Curtis, 2002). Standards-based approaches further blur the boundaries of these categories. Multidisciplinary integration might remain somewhat distinct because the procedures of the disciplines are dominant. Current thinking, however, suggests that even interdisciplinary projects should include math and literature/media to be rich and vibrant (Erickson, 1998). Interdisciplinary approaches offer an excellent fit for standards when educators approach them through a backward design process. Although teachers might organize transdisciplinary curriculum around a real-world context, the reality of covering the standards and grading in distinct subject areas quickly brings them back to the disciplines.

Is there an evolutionary continuum? We suspect that obvious differences will continue to exist in the extent to which educators choose to integrate and for how long. We believe that educators will continue to experience deepening connections as they become more experienced in this area. In an era of standards and accountability, no one approach seems preferable. Indeed, they seem more and more alike as teachers integrate standards-based planning with effective teaching and learning practices. The multidisciplinary, interdisciplinary, and transdisciplinary perspectives offer different maps to begin the design process. Teachers can use any of the approaches at any level of education, in a single classroom or in a team approach. In order for the students to be inspired enough to question the content of the module, I decided that the economic content should include contemporary issues highlighted in the media. The more the topics are discussed in the media over the year of study then the greater the likelihood of students recognizing the usefulness of the content of the module and to engaging in study of the subject. The integration of topics into a logical structure would meet part of the psychological criteria, but this proved to be incredibly difficult. Many of the topics required others to be discussed in advance. The organization of the module would be key to a logical progression and for the development of logical thought over the duration of the module. Modules with similar content taught at other universities were perused, while discussion with peers and frequent reflection and redrafting were undertaken to tighten the line along which the module would develop.

An important criterion for any final year module is that it should provide a sound foundation for advanced study, should the students wish to progress to study the topic at postgraduate level (or use the knowledge in their work or social life). This means that the content of the module should include a breadth of issues that may be required at other universities for progression to the Masters level, but also some areas involving greater analysis to ensure that the content has the required depth. Content should be updated each year. As research is undertaken across the world, it is vitally important to update our modules to make sure they are relevant, interesting and contemporary. Perhaps the ideal time for reflection and updating is at the end of the academic year despite the fact that new publications, case studies and theoretical developments are continuously occurring. The lecturer can reflect on how an individual session went and the level of student engagement and understanding immediately after the lecture. This knowledge and reflection will be lost the greater the period of time between the presentation and the modification of the content. So to ensure an effective and interesting module for the next academic year, it was my intention that the re-writing of lectures would be most

effectively carried out on a continual basis, with literature integrated into lectures throughout the year, and the rewriting and reordering of lecture and seminar content immediately after lessons.

Conclusions

This paper has presented reflections on curriculum development, pedagogy and assessment within a multi-national classroom focusing on the gifted students. We had presented basic points on essential lessons, but it is important to keep in mind that the final word is "the teachers' word. He knows his students, their capabilities and interests. It has detailed and discussed experiences of writing and compiling the module and has presented reflections based on knowledge and readings gathered on a Development Programme. Particular emphasis has been placed on my experience of designing and implementing the module, with particular foci on intentions, content, assessment and delivery. Several points are worth reiterating. First, a new academic might have little idea of how to teach effectively or how to overcome problems with student comprehension. Second, new academics should be encouraged to seek advice from more experienced colleagues, while established academics should be aware of the difficulties that the new academics face and offer appropriate assistance. Third, individuals forming policy to make new academics more effective teachers should recognize that they will have very little time to learn how to teach and to gather information that will increase their teaching performance, especially if their efforts are more geared towards research. Fourth, any guidance offered by established academics may not be fully understood at the time it is offered as new academics might not have the time to reflect on such advice.

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