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Discourse toward Revising Mathematics Curriculum in Indonesia From Six Universal Mathematical Activities' Perspective

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Abstract. This paper aims to describe one-decade mathematics curriculum condition revision in Indonesia. In one decade, there is a rapid transformation related to Indonesia curriculum including mathematics curriculum. In fact, the reason behind revising the curriculum tend to be political since the change itself happen along with the change of structure of government position, start from president until ministry of education and culture who have a big influence in changing or revising curriculum. However, the reason behind revising the curriculum is not focus in this discussion rather describing mathematics curriculum through three curricula transformation which are Competency Based Curriculum (KBK), School Based Curriculum (KTSP) and Curriculum 2013. The documents of mathematics curriculum from Junior High School grade VII will be used as a focus discussion. It shows that pattern in composing curriculum especially for one-decade mathematics curriculum is considering mathematics culture free and value less in the perspective on six universal mathematical activities

Keywords: Mathematics Curriculum, Enculturation, Six Universal Mathematical Activities

INTRODUCTION ~ For a better education, indeed every nation should strive to bring best education system in their countries, including revising curriculum as the core issue in giving better education for a better life in the future. Indonesia, as the part of a country in the world of course, should take a responsibility to maintain the quality of Indonesians life, in this case education has become a centre issue. As proof of being a part for taking responsibility in education matter, Indonesia government took a step for revising Indonesia curriculum for two years after Indonesia Independence Day (Taufik, 2013)

Indonesia has experienced eleven times of changing or transforming the curriculum since the country was established. The transformation of Indonesian curriculum can be seen as follows: curriculum 1947 (the study plans were explained clearly on the study description), curriculum 1964 (the study plans for elementary schools), curriculum 1968 for elementary schools, curriculum 1973 (a project on school of development pioneer), curriculum 1975 elementary schools, curriculum 1984, curriculum 1994, curriculum 1997 (a revision upon curriculum 1994), curriculum 2004 pioneering Kurikulum Berbasis Kompetensi (KBK) or Competence-Based Curriculum, Kurikulum Tingkat Satuan Pendidikan (KTSP) 2006, and Curriculum 2013. There are many factors, why such kind of this thing happen, in fact curriculum transformation in Indonesia has become phenomena in term of education sector. The phenomena of curriculum transformation in Indonesia are caused by the change of social dynamics and global needs. Politically, these transformations are also caused by the change of power. No wonder that there emerges an anecdote among society: "change the minister, change the curriculum." Based on the previous facts,

this anecdote is justifiable. This is important to discuss about curriculum transformation because this is a continuous issue and still progressive currently. Somehow it becomes one thing that is waited for by the society every time Indonesia will change its governmental cabinet. It is always a hot issue that attracts many people's attention, especially educational practitioners. (Ilma&Pratama, 2015)

However, currently, the tendency of Indonesia government to revise the curriculum look like out of control. Hence, the controversy of policy change in curriculum in Indonesia is inevitable. Nugraheni (2015) stated that the controversy appears because on one hand the dismissal of the curriculum 2013 to a certain school will only give a rise to the application of a double. But on the other hand, the turn and the termination of a curriculum not the main paradigm but educational world must be returned virtually educate nations. In every time, there is the curriculum developed in an accordance with the needs of his day and all that good but more important is each of the curriculum must restore the system of education as a park student's fun and put the role parents play teacher as. Transition curriculum 2006 and 2013 was unified inseparable and mutual educational objectives to sharpen Indonesia curriculum 2006 overall essentialise holistic knowledge rather than just covering cognitive but also the attitude and physical skills. Learning of a great culture is learning that reflect the values and norms culture of the nation who live in a situation of learning.

Curriculum Based Competence (KBK)

Before curriculum-based competence runs in Indonesia, there is a curriculum namely curriculum 1999 which created based on overloaded material for teachers and students in the previous curriculum 1994 (Mailizar *et el,* 2014). However, as the time elapse, during curriculum 1999 has implemented the globalisation era also required the flexibility of people to adapt with uncertainty of field work. Therefore, there is a need to not focus on hard competency only, but also soft competence (Rahdiyanta, 2003) which means contextual curriculum is one of the solutions. Considering this kind of contextuality *Kurikulum Berbasis Kompetensi* provide that image which later officially was implemented in 2004.

Kurikulum Berbasis Kompetensi (CBC) is a curriculum which was created based on two fundamental concepts namely human competence concept and mastery learning concept. Both competencies concept are the masterpieces to develop CBC whether in planning level, implementation and evaluation (Ghufron, 2002). However, teachers and educators think that this curriculum is too centralism which means that the composition of the curriculum itself was set up by centre government in Ministry of Education (Uce, 2016). Afterwards, schools applied the curriculum

based on the composition that have been made.

Curriculum 2006 (KTSP)

In 2006, Kemendiknas changed CBC (Competence Based Curriculum) into School Based Curriculum (KTSP). There was no significant change in these two curriculums, except the modification of types of texts that should be taught to the students in a certain level of education in Indonesian formal education system. Kemendiknas (Ministry of Cultural and Education) also continued the implementation of high-stakes testing and gradually increased the cut off score, namely the National Examination (UN), which was begun in 2005 and used to map the quality of education in each province in Indonesia and to determine the qualification of a student to graduate from grade 9 in Junior High School and grade 12 in Senior High School. (Putra, 2014)

However, Sulfasyah (2013) stated that even though Competence Based Curriculum is like School Based Curriculum, in fact, under KTSP, school were given more autonomy, that is, they not only responsible for developing their syllabus and learning materials but also for developing an operational curriculum. This operational curriculum produced by each school was called KTSP, meaning School-Based Curriculum. Sulfasyah also add that at least there two main factors which influenced Indonesia government moved toward a decentralised and competency based-curriculum. First factor was related to the implementation of regional autonomy that took place at the end of the 1990s. the subsequent two curricula, CBC (Competence Based Curriculum) and School Based Curriculum (KTSP), were expected to give more autonomy to schools to enable them to respond to their local context. The second factor driving this curriculum change was poor national and international results in most curriculum areas. Several surveys revealed that the achievement of Indonesian students internationally was low compared to those in other countries and students' low performance was believed to be the result of educational system implemented at that time.

Curriculum 2013

In general, there are four elements of change in curriculum 2013. They are (1) standard graduate competencies. The learners in this regard are expected to improve and balance between soft skills and hard skills that include aspects of competencies of attitudes, skills, and knowledge, (2) standards of contents. Competence is developed through integrative thematic in all subjects at the elementary school level, subjects at the level of Junior High School (SMP) and Senior High School (SMA), vocations at the level of vocational high school, (3) standard of learning processes. Standard process that was initially focused on the exploration, elaboration, and confirmation is fitted with observing, questioning,

collecting information, presenting, summing, and creating. In terms of standard of learning process learning not just happen in the classroom, but also in school and community environment, hence teacher is not only the source of study, in addition attitudes are not taught verbally, but through example and role model, and (4) standard of assessment. This standard shift from assessment through tests to the authentic assessment (measure all attitude competencies, skills and knowledge based on process and outcome, beside that strengthening criterion reference assessment also happen since assessment is not only basic competencies (KD) but also core competencies (KI) and standard of graduate competencies (SKL). Hence encouraging the use of portfolios as main instrument of assessment is very important. (Rudy, 2015).

Six Universal Mathematical Activities

As the way to discuss for one-decade mathematics curriculum in Indonesia, there is a need a tool (bridge) to explore for worthwhile discussion. Therefore, using six universals mathematical activities which are counting, measuring, locating, designing, playing, and explaining (Bishop, 1991).

Bishop (1991) continued to explain the definition of each universal mathematical activities as follow:

1. *Counting*, this is a way of distinguishing, tallying or apprehending quantities objects or events which may be perceptually or conceptually available counting. The counting of events, in contrast to objects, underlies of the understanding of prediction, probability and chance and representation of large numbers of events stimulates the need for system, for symbols and for representation such as frequency charts and graphs.

2. *Locating* emphasises the spatial geometry of position and controlled movement, and clearly should not be a mere pencil-on-paper exercise. The concepts here will derive from activities set within the child's immediate and accessible environment, and from coding and symbolising the results of those activities in various ways.

3. *Measuring* is concerned predominantly with comparing things according to a shared quality, and develops through paired comparisons to many comparisons, through convenient units to standardised units and systems of units. The notion of quality as a 'continuous' quantity is there (as opposed to the discrete, in counting) and therefore the problems, rather than the 'how many' problems which provoke counting activities.

4. *Designing* is the activity which probably makes the most obvious and immediate perceptual connections with the environment. One see shapes

around and it is very 'natural' to enquire about them particularly in the increasingly manufactured world which uses many geometrically interesting shapes.

5. *Playing* is a mathematically significant activity. The progression is from 'games' to 'mathematical games' to 'mathematics as a game' and the aesthetics of these are every bit as important in the child's cultural development as are their cognitive significance.

   Explaining, the aim of including this set of concepts in the curriculum is to focus this activity directly at what we can call the meta-conceptual level. To a certain extent this is also the case with 'playing' as we saw, but here one can engage the children directly in the way Mathematics explains, in the sort of 'answers' one can obtain to Mathematical questions, in the kinds of questions themselves and in the power (and limitation) of Mathematical explaining.

METHOD

In order to discourse or explore revising curriculum in Indonesia for this 10 year, some documents analysis was conducted. The main document is mathematics syllabus from grade VII Junior Secondary School for each curriculum from *KBK, KTSP* and *2013 curriculum* focus on numbers. Afterwards, six universal mathematical activities which are *counting, measuring, locating, designing, playing and explaining* by Bishop (1991) will be used as the reason to know what kind of activities (verb) that providing in the syllabus. Later this explanation can reach to summary whether curriculum in Indonesia was created based on the need of the society or not (enculturation).

RESULTS

Between 2004 and 2014 or a decade, Indonesia has made three times curriculum transformation which are CBC (Competence Based Curriculum) in 2004, KTSP (School Based Curriculum) in 2006 and Curriculum 2013 which officially conducted until now. For CBC (Competence Based Curriculum) is a tragic for Indonesia education experience in this past ten years. Three years for composing the curriculum and one year for implementation. The main big question is that how is it possible to see the effectiveness the curriculum with a short time period of implementation? and it is ridiculous. Indeed, the implementation of Competence Based Curriculum already started since 2001 in some pilot schools and this part is an important part to get some input to improve KBK effectiveness in terms of legibility, broadness, depth and field implementation. (National Education Department, 2003). However, in term of curriculum implementation in pilot school, it still considers as testing the curriculum not applying whole curriculum to improve Indonesia education quality. Hence, making decision to reform the curriculum

with less evaluation toward the effectiveness the previous curriculum can trigger another problem's curriculum in the future.

The following figure 1 shows standard competency of mathematics at grade VII based on *Kurikulum Berbasis Kompetensi (CBC)*.

Based on the perspective of six universal mathematical activities by Bishop (1991) by collecting the verb which provided in the syllabus, there are several verbs appear in terms of standard competency, basic competency and indicators. In terms of standard competency, in *KBK* there is an attention to conduct *counting* activities and use it in

BILANGAN

Standar Kompetensi : 1. Melakukan operasi hitung bilangan serta dapat menggunakannya dalam pemecahan masalah.

KOMPETENSI DASAR	INDIKATOR	MATERI POKOK
1.1 Menyelesaikan operasi bilangan bulat dan mengenal sifat operasi bilangan bulat.	• Memberikan contoh bilangan bulat. • Menyatakan sebuah besaran sehari-hari yang menggunakan bilangan negatif. • Menentukan letak bilangan bulat dalam garis bilangan. • Menyelesaikan operasi tambah, kurang, kali, bagi dan pangkat bilangan bulat termasuk operasi campuran. • Menentukan sifat-sifat perkalian dan pembagian bilangan negatif dengan negatif dan positif dengan negatif. • Menghitung kuadrat dan pangkat tiga serta akar kuadrat dan akar pangkat tiga bilangan bulat. • Menaksir hasil perkalian dan pembagian bilangan bulat(*). • Menemukan dan menggunakan sifat perkalian, pembagian dan perpangkatan bilangan bulat berpangkat untuk menyelesaikan masalah.	Bilangan Bulat.

Figure 1. One of Standard Competency in Mathematics at KBK

problem solving. In fact, at the first basic competency such attention seemly gone since the verb to connect standard competency is not heading to *counting* activities which enculturate student's activities to mathematics learning process. Furthermore, discussion that can be explained is the verb words that have been used in each indicator for the first basic competency in *KBK*. There are four verb words which lead to four universal mathematical activities, they are ***menyatakan sebuah besaran*** *(explaining)*, ***menentukan letak bilangan*** *(locating)*, ***menghitung kuadrat*** *(counting)*, and ***menaksir hasil*** *(measuring)*. However, the

main problem is that the verb is not connected to what students experience in their daily lives. Almost, all the verbs in these indicators provided mathematics from a European perspective which may believe that non-European cultures have not worked with mathematics and it is dangerous because there is possibility leading to "*I cannot work with mathematics*" (Shirley, 1995). In 2006, the government decided to reform the KBK curriculum to be School Based Curriculum (KTSP). It is based on Republic of Indonesia Law Number 19-year 2005 about National Education Standard which define School based curriculum is operational curriculum which composed and applied by each of educational unit. It means that school had full authority to create and conduct the curriculum based on what student's need. However, comparing the purpose of each curriculum CBC (Competence Based Curriculum) and School Based Curriculum (KTSP) both have interconnected each other which stand at the same base of *Law Number 20 Year 2003 about National Education System* and *Republic Indonesia Government Rule Number 19 Year 2005 about National Education Standard.* Therefore, School Based Curriculum consider as a refinement of Competence Based Curriculum (Muslich, 2008).

The following figure 2 shows standard competency of mathematics at grade VII based on *School Based Curriculum (KTSP)*

Back to the perspective of six universal mathematical activities by Bishop (1991) through collecting the verb which provided in the syllabus, there are several verbs appear in terms of standard competency, basic competency and indicators. However, those all verbs are not led to all universal mathematical activities, rather one verb only refers to counting which is *counting the square and cube of a whole number* in the indicator goal.

BILANGAN

Standar Kompetensi : 1. Memahami sifat-sifat operasi hitung bilangan dan penggunaannya dalam pemecahan masalah

Kompetensi Dasar	Materi Pembelajaran	Kegiatan Pembelajaran	Indikator Pencapaian Kompetensi
1.1 Melakukan operasi hitung bilangan bulat dan pecahan	Bilangan Bulat dan Bilangan Pecah	Melakukan diskusi tentang jenis-jenis bilangan bulat (*pengulangan*) Menyebutkan bilangan bulat Mengidentifikasikan besaran sehari-hari yang menggunakan bilangan bulat.	• Memberikan contoh bilangan bulat
		Membuat garis bilangan dan menentukan letak bilangan bulat pada garis bilangan	• Menentukan letak bilangan bulat pada garis bilangan
Kompetensi Dasar	**Materi Pembelajaran**	**Kegiatan Pembelajaran**	**Indikator Pencapaian Kompetensi**
		Mendiskusikan cara melakukan operasi tambah, kurang, kali, dan bagi pada bilangan bulat termasuk operasi campuran Mendiskusikan cara menentukan sifat-sifat perkalian dan pembagian bilangan bulat negatif dengan negatif dan positif dengan negatif	• Melakukan operasi tambah, kurang, kali, dan bagi bilangan bulat termasuk operasi campuran.
		Mendiskusikan untuk menentukan kuadrat dan pangkat tiga, serta akar kuadrat dan akar pangkat tiga.	• Menghitung kuadrat dan pangkat tiga bilangan bulat.
		Mendiskusikan jenis-jenis bilangan pecahan Menyebutkan bilangan pecahan. Membuat garis bilangan dan menentukan letak bilangan pecahan	• Memberikan contoh berbagai bentuk dan jenis bilangan pecahan :biasa, campuran desimal, persen.

Kompetensi Dasar	Materi Pembelajaran	Kegiatan Pembelajaran	Indikator Pencapaian Kompetensi
		pada garis bilangan.	
		Mendiskusikan bilangan pecahan senilai Mendiskusikan cara mengubah bentuk pecahan ke bentuk pecahan yang lain.	• Mengubah bentuk pecahan ke bentuk pecahan yang lain. • Mengurutkan bilangan bentuk pecahan
		Melakukan operasi hitung tambah, kurang, kali, bagi bilangan pecahan. Menuliskan bentuk baku (misal amuba yang panjangnya 0,000001 mikron). Mendiskusikan cara membulatkan bilangan pecahan sampai satu atau dua desimal.	• Menyelesaikan operasi hitung tambah, kurang, kali, bagi bilangan pecahan termasuk operasi campuran.

Figure 2. One of Standard Competency in Mathematics at KTSP

Although there are some verbs that connected to those universal mathematical activities such as determine the place of a whole number in a line number related to *locating* activity and doing discussion connected to *explaining* activities, in fact those verbs not fully stated the enculturation process in mathematics learning process rather focus on mathematics as mathematics which free from culture value. It is not what mathematics educators want to think because mathematics is not valueless. Furthermore, through looking to standard competency indeed the curriculum provider showed the emphasis on cognitive matter in learning process since it showed *understand* word as the verb. It means that standard competency in *KTSP* is massively different in focusing compare to *KBK*. On one hand, *KBK* focus on conducting activities as main goal in learning number and using it in problem solving, on the other hand *KTSP* focus on cognitive aspect in learning number later on using it in problem solving.

Nevertheless, the time for KTSP to be revised after almost 7 years have been implemented in Indonesia come. It happened, one year before the next election for new president conducted. Hence, in 2013 President Dr. Susilo Bambang Yudhonoyono through his Ministry of Education Muhammad Nun brought Curriculum 2013. Some issues also appeared that School Based Curriculum can last much more because SBY led Indonesia twice period which is 10 years (Ilma&Pratama, 2015). Some educators disagree with the statements. In fact, after new president was elected, Anies Baswedan as new ministry of education under new president Joko Widodo commanded to stop implementing 2013 for a while and based on ministry of culture and education rules number 160-year 2014, Indonesia applied two curricula together which are KTSP and curriculum 2013. Even though this confusing, that was happen in the past.

In 2015, officially Indonesia reimplemented curriculum 2013 based on revision. As explained previously, there four general change in curriculum 2013 which are Standard of graduate competencies, standard of contents, standard of learning processes, and standard of assessment. However, in this case focusing one standard which is standard of assessment in Junior High School will be beneficial since the results of monitoring and evaluation of the implementation of Curriculum 2013 at the junior high school level in 2014 shows that one of the difficulties of teachers in implementing the Curriculum 2013 is in carrying out the assessment. More than 50% of teacher's respondents stated that they have not been able to properly design, implement and process the results of the assessment. The main difficulties are in formulating indicators, organizing instrument items and conducting an attitude assessment with a variety of techniques. In addition, many teachers lack the confidence in performing skill assessments. They have not fully understood how to draw up skills instruments and rubrics (Ministry of Culture and Education, 2015). From this statement, it clearly stated that in terms of assessment standard there are two main items that become a problem in assessing three aspects in curriculum 2013 which are attitudes aspect and skills aspect, meanwhile for another aspect which knowledge aspect seem to be easier to be handled by teachers.

However, ministry of culture and education (2015) continues that the main point for tackling assessing attitudes aspect and skill aspects, teachers should be aware toward assessment procedures which are:

a. Assessment is directed to measure the achievement of Basic Competence (KD) in Core Competencies (KI) (KI-1(spiritual attitudes), KI-2 (Social attitudes), KI-3 (Knowledge attitudes, and KI-4 (Skill attitudes)

b. Assessment using the criterion reference which means the assessment

made by comparing student achievement with approval competency criteria. The results of both formative and summative assessment of a student are not compared with other student scores but compared with the required competency.

c. Assessment is done in a planned and sustainable. This means that all indicators are measured, then the results are analysed to determine the basic competencies (KD) that have been mastered and who have not, as well as to know the students' learning difficulties

d. Assessment results are analysed to determine follow-up, in the form of quality improvement program of learning, remedial program for students who achievement of competence under the Learning Process Activities (KBM), and enrichment program for students who have fulfilled the KBM. Assessment results are also used as feedback for parents / guardians of students to improve student competence.

Considering the explanation above, it seems that *curriculum 2013* tries to overcome the critics that have mentioned through *KBK* and *KTSP* through categorising core competency become three aspect which are knowledge aspect, skill aspect and attitude aspect (spiritual attitude and social attitude). Afterwards, these aspects know as four core competencies which KI 1 are (spiritual attitude), KI 2 (Social attitude), KI 3 (knowledge) and KI 4 (skills). Nevertheless, some discussion should be made as the way to examine to what extent this curriculum especially mathematics fit teachers, students and societies as the ones whose receive the impact of curriculum transformation through enculturation perspective

Kompetensi Dasar	Kegiatan Pembelajaran
3.1 Menjelaskan dan menentukan urutan pada bilangan bulat (positif dan negatif) dan pecahan (biasa, campuran, desimal, persen) 3.2 Menjelaskan dan melakukan operasi hitung bilangan bulat dan pecahan dengan memanfaatkan berbagai sifat operasi 3.3 Menjelaskan dan menentukan representasi bilangan bulat besar sebagai bilangan berpangkat bulat positif 4.1 Menyelesaikan masalah yang berkaitan dengan urutan beberapa bilangan bulat dan pecahan (biasa, campuran, desimal, persen) 4.2 Menyelesaikan masalah yang berkaitan dengan operasi hitung bilangan bulat dan pecahan 4.3 Menyelesaikan masalah yang berkaitan dengan bilangan bulat besar sebagai bilangan berpangkat bulat positif	• Mencermati permasalahan sehari-hari yang berkaitan dengan penggunaan bilangan bulat, Misal: zona pembagian waktu berdasarkan GMT (*Greenwich Meredian Time*), hasil pengukuran suhu dengan termometer, kedalaman di bawah permukaan laut, ketinggian gedung, pohon atau daratan • Mencermati urutan bilangan, sifat-sifat operasi hitung bilangan bulat, kelipatan persekutuan dan faktor persekutuan serta penerapannya • Mencermati permasalahan sehari-hari yang berkaitan dengan penggunaan pecahan. Misal: pembagian potongan kue, potongan buah, potongan gambar, potongan selembar kain/kertas, pembagian air dalam gelas, dan sebagainya • Mengumpulkan informasi tentang KPK dan FPB serta dua teknik menemukannya (pohon faktor dan pembagian bersusun) • Mengumpulkan informasi tentang bagaimana menyatakan bilangan dalam bentuk pangkat bulat • Mengumpulkan informasi tentang sifat-sifat penjumlahan dan pengurangan bilangan bulat, perkalian dan pembagian pada bilangan bulat dan pecahan • Menyajikan secara tertulis atau lisan hasil pembelajaran tentang perbandingan bilangan bulat, penjumlahan dan pengurangan bilangan bulat, perkalian dan pembagian bilangan bulat, kelipatan dan faktor bilangan bulat, perbandingan bilangan pecahan, pengali dan pembagi bilangan pecahan, dan bilangan rasional • Memecahkan masalah yang berkaitan dengan perbandingan bilangan bulat, penjumlahan dan pengurangan bilangan bulat, perkalian dan pembagian bilangan bulat, kelipatan dan faktor bilangan bulat, perbandingan bilangan pecahan, pengali dan pembagi bilangan pecahan, dan bilangan rasional

Figure 3. One of Standard Competency in Mathematics at KTSP

The following figure 3 is basic competency and learning activities in *curriculum 2013* syllabus and the core competency for KI 3 is *to understand (factual, conceptual, and procedural) knowledge based on the curiosity about science, technology, art, culture which related to phenomenon and reality.*

Through examining the verb from core competency 3 in curriculum 2013, it clearly stated that there is an attention to reach the understanding toward mathematics through *science, technology, art, culture which related to phenomenon and reality* and it is a good point of *curriculum 2013* in terms of the perspective of enculturation because the curriculum developer also put important aspect from enculturation which is understanding mathematics through culture.

However, for the basic competency verbs seems creating as the same as previous verbs in *KBK and KTSP* such as ***menjelaskan*** *(explaining),* ***menentukan*** *(determine) and* ***menyelesaikan*** *(solving)*. All the following words did not intentionally complete the verbs as universal mathematical activities rather give a sense that mathematics is culture free and of course it is against enculturation perspective.

Further discussion that can be achieved is related to learning activities for mathematics basic competency in grade VII-chapter number, where at the first activities once again, it shows a good activity through providing culture context that will be observed as mathematics learning activities. Unfortunately, for the next activities seem there is no correlation between the previous activity and again in the perspective of enculturation the next activities also end up by bring mathematics from European perspective beside Indonesia is not European. Indonesia is Indonesia which have our own characteristics and culture for a better mathematics education.

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