Redefinition of Literacy Towards EFA Era: Focusing on the Mathematics Education

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"Yet the world is also at the threshold of a new century, with all its promise and possibilities." (UNESCO, 1991)

Abstract

The increment of information used to be regarded as a good thing unconditionally. However what we realize at the corner of this century is the unequal distribution of wealth and information which causes itself grow bigger and bigger than ever before. And it poses invincible tasks to humankind.

The World Declaration, which has a symbolic meaning in the history of international cooperation, may become a cornerstone so long as we see some possibility in it and orchestrate our efforts toward the achievement of its goal. However, it may be degenerated into another empty doodle on the wall of history unless we translate these words into action. What we should do to change the possibility into the reality is to convert symbolism into practicability.

It is our task to redefine the literacy as a basic ability in this declaration and to develop the discussion based upon that definition. The critical thinking and creative attitude are the key concepts which create the circulative channel between two sides which cannot be easily fused into one. They have been employed to enable not fusion but integration of the two mathematizations, science and technique.

1. Forwards

In face of the last decade of the 20th century, we had a significant conference in Jomtien, Thailand to display our commitment towards the realization of basic education for all members of the society. Concerned bodies gathered in one place to focus all their efforts on the development of basic education. It has a significance not only from the historical point of view but also from the ethical point in global issues. This is why the very symbolical expression was necessary in the World declaration on Education for All (EFA) and the participants sincerely expressed their sympathetic opinions towards the fulfillment of the Declaration. However as Sawamura (1998) pointed out, its concretization and realization still remain as a future task because of the symbolic nature of the words. Therefore, the issue on which we

deliberated here is to reconsider the meaning of literacy as a basic ability in the field of mathematics education.

Some people may regard literacy simply as reading and writing abilities, but the literacy in this paper implies more applied and at the same time more fundamental ability than this usual definition. It is more applied in the sense that the three basic R's are combined with other knowledge and ability while it is more fundamental in the sense that children bear the ability to judge and analyze even before they are taught how to read or write. So the new literacy penetrates from the fundamental to the applied.

As Keitel (1997, p.2) put it,

> "Society becomes increasingly formalized and mathematized by the influence of large-scale economic and technological change. ... However, while the objective importance of mathematics in our societies has increased dramatically, that of much of the mathematics taught in schools to individual pupils has rapidly decreased. ... an increasing mathematization of our society is complemented by an increasing demathematization of its members."

the more mathematized the society is, the more demathematized its member is. This simultaneous process of mathematization and demathematization itself has both good and bad impacts on the society. It lessens the individual burden not only to calculate but also to do manual work and far communication. And this innovation opens up the new possibilities for the disabled and the person at home. On the other hand, it has realized the big system of automation most part of which is invisible and inaccessible to us. There are many loopholes for criminals to manipulate the software and data by fraud. Thus the critical thinking is a key word in this society and it connects the fundamental to the applied in the above.

When the word 'basic education' is mentioned in EFA, very broad range of education is included into that word. However, when we use the word 'literacy' as a basic ability, our attention is focused more on the primary and fundamental part of secondary education. Some people may voice their negative opinions against the inclusion of secondary education by pointing at the fact that there exist many drop-outs and repeaters even in the primary education and the introduction of non-formal education is being discussed for its solution. And others may say the secondary education should be discussed in connection with the tertiary education for the development of technology in the society. However what we have tried here is quite opposite to these and it is to interpret the secondary education on the extension of primary education. And this, we think, revitalizes the significance of literacy and thus the role of formal education. It is not whether non-formal education should fill the place of formal education because the latter is inefficient in some aspects, but the problem at stake is what and how the formal education can attain these new visions.

Thus there are two objectives which we would like to address in this paper.

1. to clarify the background and its contents which necessitates a new perspective of literacy
2. to provide and discuss practical examples in mathematics education based on the concept of the new literacy

By doing these, our intention is to develop the discussion based not only upon the theoretical framework but also upon the practical application.

2. Shift from functional literacy to new literacy

One could argue that the three R's (reading, writing, and arithmetic) is equivalent of the 'input, output, and processing' of information from a different angle. Thus we would like to demarcate the history

in terms of the information media and characterize the role of literacy in each era.

Information must have existed since the very beginning of mankind and it had been taken for granted for a long period. Once mankind invented letters, some important information were recorded down on clay slate, bark or later paper. The use of letters during that time was very much limited to those privileged class of people. Much later times the invention of printing technology enabled mass copy of information and gradually freed information to the populace. As a result of this they were required of the three R's in every corner of life such as a factory and a shop. Then to be able to read, to write and to do arithmetic was important itself.

However the information itself was not seriously discussed as an object of interest until the computer has increased tremendously the amount of information beyond the capacity of human being and has changed its status to the one similar to that of material. Radio, TV, video and so on have changed and enriched the quality of information, and computer is currently integrating the information created via these media besides this quantitative change. The digitalization of information is at present in progress so that all information can be handled and processed monopolistically by computer. And the emergence of this information society requires a new type of ability for its members. This ability is to be called a new literacy which implies ability to process and create information rather than ability to keep information. If the functional literacy is to only digest and use information when necessity arises, the new literacy is to view our world critically and expand it with creation of information.

Table 1. Literacy in Each Era

	in the pre-printing era	in the printing era	in the multi-media era
The literacy is:	limited to the privileged few.	a tool for work.	a tool for work and a tool to act and create on the environment.

This literacy is important in developing countries as well. The below figure tells us the state of information in both developing and developed countries. The vertical axis indicates credibility on information and the horizontal axis shows the number of information sources. Tribe society is located top left and an advanced country is top right. A developing country is bottom middle because of conflict between modernization and tradition or regional culture. Such conflict causes the credibility to go down although the number of information sources increases very much compared with that in tribe society.

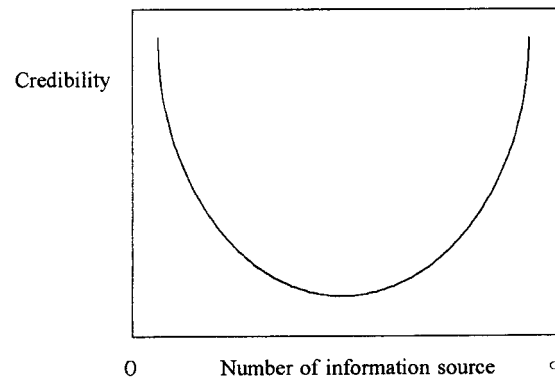

Fig. 1 Crediblity and Source in Information (Iwasaki, et al. 1999, p.45)

Besides this low credibility which causes serious confrontation between new and old values, the imbalance in information possession seems to reproduce the imbalance in economical and social order. This is one of the biggest issues to tackle in order to live up with the ideal of EFA. The new literacy therefore is to view the realities and others' opinions critically.

3. Components of media literacy and its relation with new literacy

As it was discussed in the previous section, the transformation in the concept of literacy is deeply rooted in the emergence of multi-media. So in this section we would first discuss the literacy which directly deals with multi-media and then proceed to analyze its relationship with the new literacy which has been discussed in the previous section.

In February 1985, the Ministry of Education established the 'Cooperative Research Council on the directions of Primary and Secondary Education in coping with Information-oriented Society'. Mizukoshi (1988, pp.2-3), one of the members of this Council, defined media literacy as '*individual basic skills in order to autonomously choose and utilize information and media skills*'. He mentioned the following four points to characterize media literacy in more detail:

1. the ability to interpret, select, arrange, and process the existing information, and to create and communicate new information,
2. the understanding towards the characteristics of an information-oriented society and its influence on society and people,
3. the awareness of the importance of information and the responsibility towards its usage,
4. the understanding of the basics and characteristics of information science, and the acquisition of basic operational ability.

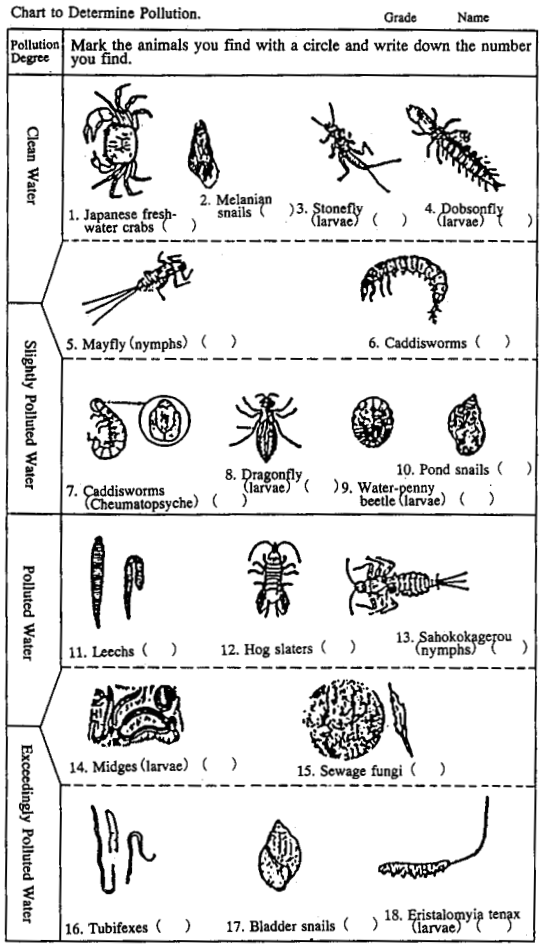

Fig. 2 Table for Experience Learning (Numata, 1992, p132)

The objectives of information education by means of multimedia is the development of media literacy. Two streams can be identified in the current information education. One stream is to learn about hardware and software for information processing as a rather separate component, and the other is to learn regular school subjects into which information education is integrated. In relation with the former stream, a domain on 'Information Basics' has been established in the subject, technical arts and home economics, at junior high school. Its content consists, among others, of the mechanisms and operation of a computer and interaction among computers, society, and people. In the latter stream, media literacy can be discussed within the framework of existing school subjects since it focuses on selection, arrangement, and processing of information and moreover creation and communication of information by use of multi-media.

In every era and society, literacy has been deeply related to daily life. In other words, three R's (reading, writing and arithmetic) have been studied for the practical use of letters and numbers necessitated in the daily life rather than for the academic use of abstract symbols. In short, tools should have appropriate purposes of their own, and media literacy, with the computer as its core, is no exception. In this sense, it seems to be sound and appropriate to cultivate these new abilities in relation with school subjects.

For instance, as a learning activity to arrange, process and interpret data, it is relevant to let students examine the level and the cause of water pollution by plotting the number and the distribution of aquatic animals on a map of rivers, as shown in Figure 1.2. This activity gives students a chance to think about the environmental problem through the data about aquatic animals.

In the next example of language class, summarizing an explanatory essay may be regarded as a training for processing and creating of information in which the students attempt to mark keywords in each paragraph and to summarize the whole essay through construction of the structured relationship between the keywords. Both activities encourage students to weave their own meanings out of experience and thought through the acquired data. Namely the literacy achieved in these activities is not only for adapting to surroundings but for self-representation.

As a summary of concept of media literacy, Mizukoshi & Saeki (1996) referred to the following table. There are three roles expected in each student, namely receiver, user and creator and in this order the level of requirement for each role goes higher. As this table suggests, to become a creator requires to be a receiver and a user at first, and the final objective of information education is to nurture the quality of creator, that is to understand, to use and to create, in each student. However the ability to create information not only depends upon the ability to understand and to use information but also influences them to be refined. This reciprocity enforces these abilities individually and develops them into the integrated higher-order ability.

Table 2. The Concept of Media Literacy
(Mizukoshi & Saeki, 1996, p.24)

receiver	understand		
user	understand	use	
creator	understand	use	create
	critical understanding	selective utilization	construction production

The emergence of multi-media society, which is supported by the mathematized system with computer in its core, has dematematized its members and caused imbalance in terms of possession of information. And if this is called a shadowy side of the society, there is a positive side of it as well. That means it enables and necessitates two way communication between the subject and his/her environment more than ever before. As for the new literacy in the previous section the critical attitude is a countermeasure against the former shadowy side of this society, and a positive attitude or a creative attitude is an effective use of the latter bright side of it.

However both of them cannot exist in isolation. Critical thinking or criticism without creative attitude towards the common goal may become simply a curse, which only functions in a destructive manner. And uncontrolled creation and unreflexive positiveness in thinking may just produce, if not noise, a myriad of trifle information although the positive attitude toward the environment is the most important thing in this society. That is why the new literacy with its focus of the critical thinking towards the environment cannot play a full role unless it is combined with creativeness and positiveness.

4. Mathematization

There have been two main streams of the meritocratic and attitude-oriented views of learning abilities in mathematics education. We could call the meritocratic view 'essentialism', which has as a basic premise the formation of curriculum based on scientifically tested methods. The latter is Dewey's 'progressivism', with as main premises the formation of curriculum on the basis of everyday life. These two tend to dominate views about learning abilities in turns without ever disappearing.

Taking these contrastive views on learning abilities into consideration, the definition of learning ability may become rather vague as 'an ability to study'. Since 'to study' is interpreted as 'to know unknown things', we cannot discuss about the learning ability without considering 'to know', which is very basic psychological function. And if we try to examine what 'to know' means, we might think this is too fundamental to analyze any further. However, in German language, 'to know' can be translated into two separate terms, namely, 'zu kennen' and 'zu wissen'. Inferring the difference from the nominal forms of both verbs, that is, 'die Kunst' and 'die Wissenschaft', the former means the method which depends on experiences and attaches more importance to techniques, and the latter means the method which depends on logic and attaches more importance to the coherence of theory.

In order to explain these difference, let us consider the case 'to know' the length of a diagonal line of gravestone. From the standpoint of 'zu kennen', knowing the length of diagonal line does not make any sense unless it is related to any part of daily life. As a matter of fact, the price of a gravestone in Japan, which usually looks like a box, is based neither on the surface area nor on the volume, but on the length of its diagonal line. If so, a contrivance is necessary in order to know the length which cannot be measured directly. This necessity leads us to find out ideas or techniques to measure indirectly the length of diagonal line, for example, by making the imaginary cuboid of the same shape as shown in Fig.3.

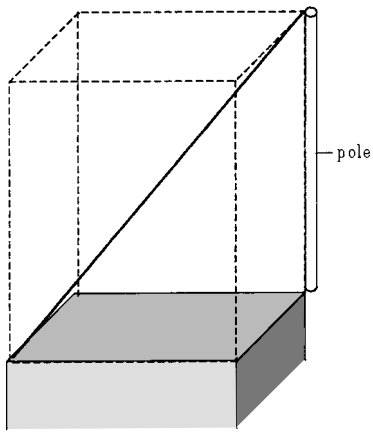

Fig. 3 The Price of a Gravestone

On the other hand, from the standpoint of 'zu wissen', knowing the length of diagonal line is the intellectual activity to pursue theoretical authority and methodological generality. And one of the fruits of the activity can be found in the first volume of the Elements, which was edited by Euclid 2200 years ago. This volume, which consists of 23 definitions, 5 axioms, 5 postulations and 48 propositions, is a system of proofs regarding the length of diagonal line, that is, the Pythagorean theorem.

If we call the former method a 'technique' and the latter an 'science', the technique is knowledge or skills necessary for ordinary people, and the science is the culture for so-called elite group. Before the emergence of multi-media era, this kind of separation may have functioned to certain extent for the sake of mass-production. At the present era in which information is manifold and is destined to be rewritten after a while, however the technique which is somewhat static and closely related to daily life cannot survive this fast changing reality, and the science which is too rigid to absorb the irregularities may isolate itself form real part of life. And the rapid increase of the university graduates opened up new possibility and we are now witnessing the creation of new values that attempt to integrate both 'science' and 'technique'.

The same discussion cannot be simply applied to the case of the developing countries where intellectual mass society and trade of information have not been realized fully yet. Despite this fact, the above integration of science and technique is necessitated by the specific situation which these countries are now facing. That is, they are suffering from the mass poverty and more severely the big imbalance between this majority have-nots and the minority haves. Needless to say, the technique is important to prepare the students for job but the bridge between technique and science is more important to alleviate their problematic situation. While the former preparation for jobs corresponds with a functional literacy, the new literacy of this paper is required of integration of science and technique in the latter.

And furthermore, the realty is that both the developed countries and the developing countries can not exist in isolation. They have to live up with the same time of reality and the same global issues which unavoidably link them together on the earth. The problem in one country affects the situation of another country. Therefore, integration should alter separation, and what to consider is how to approach these issues.

Again in the above question of a gravestone, how can we set the price if we do not have an actual stone but only a set of three numerical values of '(length) × (width) × (height)'? Although the Pythagorean theorem is obviously the only solution for it, its formula provides just a chance to imagine the diagonal line of a gravestone and to infer its length in order to decide its price. Automatic substitution into the formula with numerical data cannot compare with the active contrivances and creation of ideas by artisans and masons. In short, even in such a simple situation it is impossible to say that the information is applied in the correct sense of the word, if technique and science are in separation. Thus, it is learning through problem-solving (LTPS) that can offer a situation in which both technique and science can be integrated.

Since mathematics is an intellectual tool that mankind has developed through its long history as a result of accumulation and organization of social thought, the tool should have its own purpose which deserves the specific historical development. When we pay due attention to this peculiar point in education, the learning activity in mathematics becomes problem-solving oriented. However, it should be noted that the tool has two main purposes, to create the other tools and to increase the productivity. Similarly mathematics education also have two categories, mathematical contents which build themselves upon and mathematical methods which are applied and extended beyond mathematical field. The former is an activity from the point of science, and it is sometimes called a vertical mathematization. The latter is an activity from the point of a technique, and it is sometimes called a horizontal mathematization. Although we have discussed the mathematization of society in section 1, it meant that mathematics is implicitly employed to operate the social system. On the other hand, the mathematization here refers to a mathematical activity at the classroom level.

As a summary of discussion so far, we can characterize two mathematizations in the following table. The first mathematization is called theory development, because this is to *Create* new symbols, ideas and concepts within mathematics. In this sense it is closely related to mathematical contents and is detached from the situation and its necessity. The other mathematization is called linkage development, because this is to *Use* mathematical knowledge in the events and situation outside mathematics or to *Understand* them mathematically. In this sense mathematics here is treated as methods and more focus is placed on practicability rather than theoretical consistency. However its application is confined within the original situation.

Integration of these two mathematizations is a center of discussion here. As Skovsmose (1994, p.63)

Table 3. Type of Mathematization

type of mathematization	supporting view	category	type of construction
vertical mathematization	meritocratic view	science : mathematical contents	theory development
horizontal mathematization	progressive view	technique : mathematical methods	linkage development

pointed out, some teaching materials are physically concrete but socially abstract. Although we discussed earlier that LTPS can provide a situation which can integrate both mathematizations, it is not an automatic process to start and move toward their integration. If the theory development is haphazardly sought before the linkage development is well made, then both of them will easily fall apart and collapse.

In order to make them intersect, stimulate and develop each other, the critical thinking and creative attitude play a crucial role. Applying three activities, that is to understand, to use and to create in section 3, we would deliberate on it further. We may say that the first two of these activities belong to the horizontal and the last one belongs to the vertical mathematization. The creative attitude mediates between what you use or understand at present and what you are going to create or others have created. And the creative attitude may pose a question and thus a rationale for creation of alternative against what you use or understand. By intersecting these activities, both mathematizations gradually grow bigger to include more materials to understand, to use and to create.

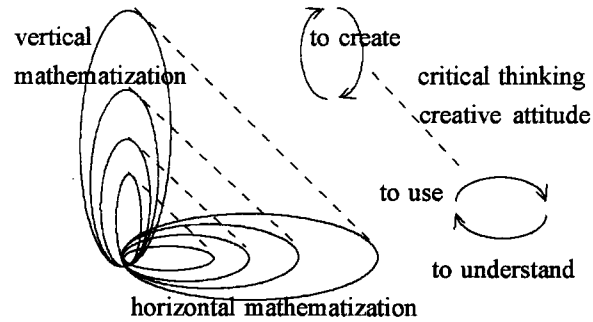

Fig. 4 Integration of Two Mathematization

5. Contribution of mathematics education to the development of new literacy

Often the school knowledge has been criticized as a collection of unrelated pieces of knowledge which does not function as a compass to the problem encountered in the daily life. Naturally any knowledge, as it is, cannot be applied to the situation other than the one in which it was invented to resolve a specific problem. Here if knowledge is interpreted as a network of internalized information and meta-information, a new information is to be created to apply the situation-specific knowledge beyond this situation. In this sense, the following examples offer some ways of creating a new information in order to fill a crevice of the existing information and develop them into a more complete set of information.

Here we would like to take up two examples to develop our discussion practically.

a) Number of soybeans

With the help of computer and software, various statistical quantities can be calculated and a table and a graph of the frequency distribution can be drawn up instantly. However, neither hardware nor software can collect data, interpret a table and a graph, and clarify problems. Therefore, children should know how to collect, classify and arrange the data (or statistical information) which a representative value, such as a mean or an index, can be calculated with, and subsequently how to make issues visible.

(Case 1) Number of soybeans
Subject: Mathematics
Topic: Statistical reasoning
Target: Grade 6

Let us first consider the question "how many beans are there in a 1kg bag of beans?". Suppose bags of 1kg beans are distributed to students and they are asked to find out the number of beans in their bags. Since counting all the grains is laborious for the students, they are told to estimate the number first and to examine if this estimated number is correct without counting them all.

Suppose that a student found that 100 grains weighs 120g and he/she made a proportional equation as follows:

$100 : x = 120 : 1000, \quad x=833.333$

and concludes that, 'the total number of grains is about 830'.

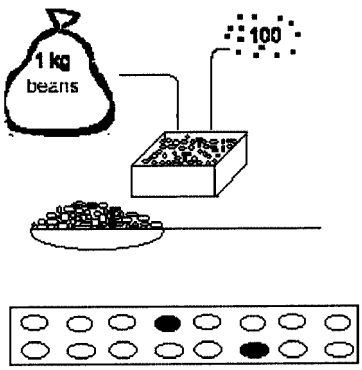

Fig. 5 The Number of Beans

The next level of learning starts if other children ask 'Is that so?'. Then, they start to weigh again 100 grains of beans up to the first decimal place this time. They weigh 100 grains in each group, calculate an average score from each group's results, and then estimate the number of soybean grains in 1 kg. These activities can be regarded as statistical processing. In other words, media literacy is naturally practiced from the stimulation by an actual situation.

As a next step, one could ask what to do if we can't measure the weight because we don't have any scales. Then, there might be a child who works out the problem as follows. It has prepared 100 black soybeans, which have almost the same size of white soybeans, and then the black soybeans are mixed with the white ones thoroughly. After this, we scoop up the mixed beans using a big spoon and count the number of white soybeans and the black ones. We repeat the same procedure ten times and calculate the average respectively. Supposing that the average number of white soybeans and black soybeans is respectivley 18 and 2, therefore, the number of soybeans is 900 like the following way: $2 :100 = 18: x \;\; x = 900$

This is also a clever way of statistical processing which means a sample research in this case.

If somebody points out here that 'the result obtained from the weight is different from that from a proportion', the accuracy of statistical results will become an issue. Conjectural statistics is necessary to answer this question exactly, but at this level, it would be enough to reaffirm the accuracy or inaccuracy of statistical thought in each attempt, by comparing the estimate and the result from the statistics. It is possible to say that statistics, in the first place, was established because of the considerations of inaccuracy. It is because our cognition and observation is always accompanied with some degree of inaccuracy. As the precaution for this, we take the averages of the results in the above occasion, and made it possible to express the statistical significance of the conclusions numerically.

b) Milk production

Though the help of computer and other sophisticated devices may not be available often in the developing countries, the essence of statistics can be realized still by manual work and rational judgment. The

following example is taken from the mathematics textbook of Kenya but the questions are changed to suit the objective of this paper. The most important point of this material is to estimate and judge in terms of experiences and statistics, and to act on the reality positively in a broad sense.

(Case 2) Milk production
Subject: Mathematics
Topic: Graphs
Target: Grade 5

Questions

1) In next month, how many liters of milk are expected? State the reason why you expect the amount.
2) If in next month 900 liters of milk are produced, state the reason.
3) If the number of cows becomes doubled, how many liters of milk are expected? State the reason.
4) In next three months, how many liters of milk are expected? State the reason.

The students are repeatedly asked why they think that way and compare their estimation and judgment with others'. A lot of factors such as type, size, condition of cow, weather and fodder etc., are involved in reality and the right answer may differ from place to place and from time to time. However, this is exactly the reason why the statistics is invented. In other words it can provide a tool like interpolation and extrapolation that humankind invented to overcome the limitation of place and time.

Since a situation where technique and science are integrated, is sought in the statistical education, we should be ready to go back to the real situation any time. Statistics itself requires for such integration, but more acutely the room of discussion should be created between the judgment based on experience and the one based on statistics. Statistical judgment seems, if not running away into the abstractness of theory, nonsense before common sense as a accumulation of experiences especially when we deal with the real life situation. However, when we face a new situation which experience cannot cover or the accuracy of information may not be known, statistics may play a role to show some guidance towards its solution.

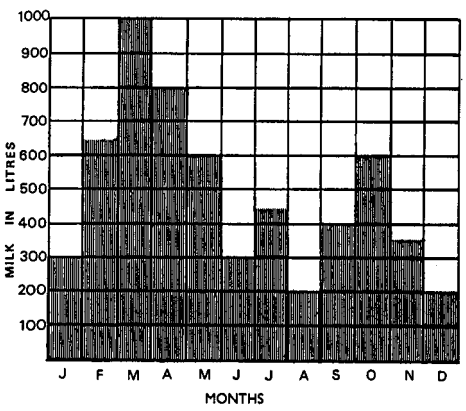

Fig. 6 Milk Production
(Republic of Kenya, 1984, p.111)

Again coming back to the discussion of previous section, let us consider the relation between the mathematics education and information education. In relation to the LTPS, the statistics is one of the best teaching materials, due to the following points. Firstly, it is necessary for the students to start with the phase of collecting and arranging data in statistical education. They have to identify for themselves what is the problem. Secondly, the collected and arranged data should be processed towards the solution of problems. Through the phase of processing the data, the students are required to construct both the linkage of the problem and the mathematics out of it. Both phases should provide a step further from the current practice in mathematics education where the problem is already

given. That means that solving problems this way corresponds to the creation of information. Therefore, to perform a series of intellectual activities such as taking, reading of data and solving of problems in an integrated manner, means that statistical teaching is located at the intersection of mathematics education and information education. And in this sense it is the most appropriate material for the development of the new literacy in mathematics education.

In the former case of soybeans there may be several ways of counting them and what is important here is to create information on the concepts and relationship of those different counting ways. Thus the counting activity can apply even to the different situations and to the different materials. In the latter example of milk production, the processing of the given information plays an important role to answer the questions following it. The raw information, if not useless, may be trivial but the appropriate processing and interpretation can change its value. That is why the indifference towards importance of the information may lose fortune.

Since in the developed countries the information is immense in quantity, the focus of statistical education is on its process. Thus the descriptive statistics comes first in order to grasp a tendency of the given situation precisely. On the other hand because the information is scarce and lacks credibility in the developing countries, the focus of statistics education is more on its selection and estimation. This is why the conjectural statistics is given preference there. Of course both statistics are necessary for any countries depending upon the situation. After all the most important thing in statistical education is to act on the real world positively in order to connect the real world to the theoretical world with full use of statistical knowledge. That is in the same tune as in the development of the new literacy.

6. Conclusion

So far, we have accomplished two objectives which were targeted at the beginning of this paper. The first one is to clarify the background and contents of a new literacy. Especially the contents have been discussed in comparison with media literacy. The concept of literacy in this paper has been discussed in such a wider context as an ability to understand, use and create information. And it gives a new role to this concept of literacy to think of the connection of the secondary education to the primary education. The new literacy is pillar which penetrates through the basic education as an ability to view the world critically and act on it in a creative way.

The second one is to provide some practical examples of teaching material based on this discussion and two mathematization. These examples are regarded to give basis for the discussion of the literacy. In such a dynamic system as today's society, it is not just enough to wait for something favorable to happen but it is necessary to create one's own information in between various information.

In other words, the positive and creative attitude towards information and critical thinking is essential. The positiveness and creativeness of attitude means to take an action towards information and make a decision depending upon the feedback. Here, highly sophisticated knowledge or technique is not necessarily required of but rather it is important to go back to the basics in the process of acquisition of knowledge. On the other hand, the critical thinking is the activity which assures the autonomy in the process of information and has a function to judge the acquired information against one's own schema before absorption of information and transformation of schema. We believe that these attitude and activity can facilitate integration of two mathematization and in reciprocity they are also strengthened within the learning through problems. In other words, they follow the ideal of the new literacy which was dis-

cussed earlier on in this paper and materialize it into the classroom lesson.

This paper has approached towards the issue of the basic education of EFA from the perspective of literacy and has developed the discussion based on some examples of Learning Through Problem Solving. Now we would like to locate this research within the world-wide movement of mathematics education research, and at the same time open up a possibility for its further development. Some countries like U.S.A. and U.K. have tried to standardize their curriculum against their traditional educational practice. This standardization was initiated to uplift the level of educational performance. Interestingly the countries such as Japan, Singapore (Davie, 1998) which performed very well in the past IEA examinations are now trying to slim down the teaching contents of mathematics. Both of them seem to represent more or less other developed countries and they seek for what is the basic ability in mathematics education although the approaches are quite different. The literacy of this paper approached towards it from a different angle with the intention of attainment of EFA.

On the other hand, in economically newly emerging countries such as ASEAN countries, mathematics and science oriented students are highly on demand. And even in many African countries which are suffering from the financial problem, mathematics and science are believed to have potential power to initiate the industrial and thus economical upthrust. We intended to approach at the same time the latent problems behind this optimistic view of mathematics and science from the angle of critical literacy.

From these movements, what we should learn is to stop thinking to transplant a model simply from one country to another country. It is because each country has its own problems rooted in its specific history and tradition. According to Berry (1985) the difference in the language reflects the difference in the cognition from culture to culture and it brings unconsciously some burden to children to learn in a language which is not their mother tongue. Then another level of critical thinking is required of curriculum planner to take into consideration commonality and specificity. Needles to say, culture plays an important role for human beings. However this fact should not just glorify the status of culture. Important thing is to base ourselves upon the culture and begin our thinking from that point and there can be found true ownership which does not end in political ‘sprechchor’.

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