

## Cosmologist or mathematician

Several weeks ago, I had an opportunity to speak with elementary and second school teachers. One is a middle-aged science teacher, he glanced at my my own material indicating discrete mathematics entitled 'Math & Programmings.' To my surprise he said abruptly "soft? you've being involved in such an industry, haven't you?" The inverted method in Japanese is a way of speaking in which the order of subjects and predicates is switched, a way of speaking that is said to be peer language. In addition, when I was asked from him what your specialty is? I answered "Cosmology." Thereupon, he quickly replied "Oh, it is cosmetics industry, isn't it?" It was the unexpected response. Further more I said "astronomy," however, it was a gobble de gook, after all. Even if it is said I'm a mathematician, they couldn't communicate with me. So I think that internationalization of science education in school is behind or biased. Most school education officials are not concerned about new surprises. Is that Japanese educational would be so sloppy compared with other industrial countries.

He seemed to think that programming and software industry training are synonyms, moreover, to be unable to understand what mathematics and software were being discussed together. I took it for an implied contempt in his saying of which geeks work intensively as a programmer of games or somethings like in the software industry in Japan. I felt actually in this country that the meaning of technical term 'soft' has been definitely dwarfed, even though algorithm and programming as one discipline of mathematics and computer science is getting more and more important in the coming artificial intelligent era. However, I didn't explain to him exactly, without commenting on detailed words on the spar of the moment.

Speaking of programmer in The United States, it is a profession recognized and respected as a technician who can work on for any ages. So, I emphasized him that it was a mathematical field required as for a target of STEM education. Programming is an intellectual task of doing calculations really. I should have to let him know the term the different between programming and algorithm. It is defined as a procedure to calculate what can be calculated in finite time is called an algorithm. So the key is the algorithm. I heard Japan has not educated algorithms in school so far. On the other hand, I spoke to him a short story of Katherine Johnson, a mathematician and programmer, who was active in NASA's Apollo projects. Lego has praised her achievements and has released a Lego block that shaped her. However he seemed to has never heard such a black woman's name. It is not of great value both to science educators and to administrators such him. Apparently even administrators seem to have no understandings of the scientific field, particularly the mathematics field, that influence science and industry of the new era. Nobody recognizes in fact that Japanese science education is behind from other industrial countries definitely.

It seems to have neglected algorithmic education in this country's school education so far. However, it's decided to teach algorithms and programmings in primary school alongside oversea industrial countries. Nevertheless, at the educational site, it will be totally confused by who taught what. On the other hand, the term "algorithm" has been extended and interpreted, and it is beginning to be used like a fashionable word. For example, it is an extraordinary usage, such as the algorithm of the way of speaking and the algorithm of moral education. Here, when defining the algorithm again, the procedure to calculate what can be calculated with a finite time, that is, the algorithm is called an algorithm. I wanted to talk about the difference between algorithm and programming, but I thought that it would be a waste of time.

## コスモロジストかマスマティシャン

数週間前、私はこの国のプライマリとセカンダリスクールの教師と話す機会があった。一人の中年男性の理科教師に、Math & Programmingsと題した離散数学講座の教材を見せると、「あー、ソフトですか、やっているのは!」とのひと言が、それも倒置法でかえってきた。倒置法とは、主語と述語の順番が入れ替わる話し方で、ピアラングエッジ、いわゆるタメぐちといわれる話し方だ。

さらに、加えて、あなたの専門分野は?と聞かれたから、コスモロジーと答えると、「あー、化粧品業界ですかあ」と、これまた思いがけない反応が返ってきた。もっとも、アストロノミーといっても通じないだろし、天文学や宇宙技術など考えも及ばない様子で、会話に窮してしまった。多分、数学者の意味でマスマティシャンといっても、相手が英語教師か科学者でないと通じない。日本では、科学分野の国際化が遅れているし偏っている。多くの学校教育関係者は、国際的な教育水準の話についてこれない。この国の教育は、そんなもんですかあと、ため息を吐いた...

彼の頭の中では、プログラミングをソフト産業教育訓練という言葉と同義語に扱っているようだ。日本のソフトウェア産業では、例えば、オタクといわれる異星人たちがゲームなどのプログラマとして労働集約的に働く仕事という、ある一種の軽蔑の意味がこもっている。実は、数学分野としてのアルゴリズムやプログラミング、そして数学を教えているんですと返しても、詳しい説明なくしては通じない。米国でプログラマといえば、テクニシャンとして認められ尊敬される職業であり、加齢期の幾つになっても勤める人が少なくない。NASAのアポロ計画で活躍した数学者キャサリン・ジョンソン Katherine Johnsonの話しを彼にした。教育玩具のLego社は、彼女の業績を称賛し、彼女を形取ったレゴブロックをリリースしている。しかし、そんな黒人女性科学者の名前を聞いたことがないようすだった。そんな話は、この国の科学教育者や学校管理者には興味はないということだ。科学と産業を支える新しい教育分野への理解がないのが、遅れた先進工業国日本の現状を物語っている。数理科学としてのプログラミングは、これからの宇宙開発やAIの時代が要請する先端分野でもあり、STEM教育のターゲットにもなっている分野だと強調しておいた。

これまで、この国の学校教育ではアルゴリズム教育を怠ってきたようだ。それが海外の事例に倣って、アルゴリズムとプログラミングを教えることになった。

ところが、教育現場では、誰が何を教えるかで混乱している。

さらに、このアルゴリズムという言葉を広義解釈して流行り言葉のように使い始めている。

例えば、話し方のアルゴリズムとか道徳教育のアルゴリズムというように、的外れな使い方だ。

ここで、改めてアルゴリズムの定義を述べると、有限時間で計算可能なものを計算する手続き、つまり算法のことをアルゴリズムという。

アルゴリズムとプログラミングの違いも話したかったが、時間の無駄になると思い止まった。