Motivations For Learning

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This section has been abstracted from the text by Richard Skemp titled "The Psychology of Learning Mathematics". Even though most of the ideas presented here were written orginally towards learning mathematics, they are pretty much applicable to any subject that we intend to learn. Thus it begins.

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So far our efforts have been directed towards trying to understand some of the factors which affect the learning and understanding of mathematics, on the assumption that we, or the student concerned, want to do so. But now, let us in all seroiusness ask the question: Why should anyone want to learn mathematics? It is indeed arguable that this question should have come right at the start of the inquiry, since without some kind of motivation there should be no reason to expect anyone to make the neccessary effort. However, if you have bought this book you probably have some kind of motivation. So let us now look at what this might be - or these, since several motivations may combine in a single activity.

"Motivated" is a description we apply to behavior which is directed towards the satisfaction of some need. If we say that a certain piece of behavior seems motiveless to us, we mean that we do not know, and cannot even guess, what need is satisfied by means of it. So questions about motives are usually, in disguise, questions about needs.

Some needs such as food, warmth, sleep are innate. Others such a tobacco, soap, a television set are learnt. Mathematics seems fairly obviously to be a learnt need; So how(if at all) do people learn to need mathematics?

One way in which new needs can acquired is by learning that they lead to the satisfaction of already existing needs. In our present culture we soon learn that if we have money, we can use is it many different ways to satisfy

a wide variety of needs. Mathematics is also a valuable and general-purpose technique for satisfying other needs. It is widely known to be an essential tool of science, technology and commerce; and for entry to many professions. These are goals that motivate many adults to mathematics; but they are too remote to be applicable to the early years of school, when we first begin mathematics. In the classroom, short-term motivations are more likely to be effective; two of the most directly applicable here are the desire to please the teacher, and the fear of displeasing her or him. Reward and punishment are widely used as methods of training both children and other young animals, and are older than schools themselves.

Both these kinds of motivations are extrinsic to mathematics itself, however. Teachers can be pleased, or their displeasure avoided, by emitting the desired behavior (verbal or written) with little or no understanding; so there is no gaurantee that understanding has been achieved. Indeed, since understanding can take longer than parrot-learning, extrinsic motivation of either kind may favor the later because it brings prompter results- quicker approval, or quicker relief from anxiety, as the case may be. Of the two, motivation by anxiety is probably the more conducive to rote-learning because, as we have already seen, it has an inhibitory effect on the reflective activity of intelligence.

Intrinsic Motivations:

But there are some people for whom mathematics is a pleasurable and worthwhile activity in itself, regardless of any other goals which it may also serve. These are the people whom I regard as true mathematicians; and if this view is accepted, then some seven-, ten-, and twleve-year-olds merit the description as much as, or more than, many sixth-form and adult students. Why people to should enjoy learning and practising mathematics for its own sake, however, far from obvious we keep to our original hypotheseis that any motivated behvior satisfies some need.

Let us approach the problem indirectly, by the way of other examples. Look at a child, out for a walk with parents, balancing along a low wall in preference to walking along a pavement. Or look at a dinghy sailor, sitting precariously out over the water in prefernce to the greater certainty and convenience of an outboard motor. Or look at a mountaineer, laboriously and hazardously climbing a mountain, which he could ascend quickly and safely by a funicular railway. Wall-walking, sailing, mountaineering are not basic needs; but neither do they appear to be used as a means to other goals,

since in each of these examples there is a simpler and more direct means of attaining the end.

The apparent contradiction can be resolved if we hypothesize another very basic, very general need; a need to grow. The word "grow" is used here to include not only physical growth, but growth in skill, power, knowledge, and any other physical, sensori-motor, or mental organization which actuallyor potentially favors survival. A young child does not need to balance on walls, climb trees, jump off climbing frames, do forward rolls. But all of these serve, very directly, his growth needs; they develop his lungs, muscles and control.

Mental growth is even more important for survival than physical growth; and activities which contribute to mental growth should therefore be enjoyed by children at least as much as physical activities. Mental growth, moreover can continue long after physical growth has ceased; so the pleasures which come from various ways of exercising one's intelligence should continue from childhood to oldage. If it is agreed that mathematics is simply a specialized form of intelligent activity then we need no longer wonder why it should be enjoyable for its own sake.

The enjoyment we experience from activities, physical or mental, which serve our growth needs are experienced as intrinsic in the activity itself. A child doesn't like climbing because he knows that it will make him stronger and agile. Rather, he grows strong and agile because he is climbing. What is more, letting children climb trees is a better way to help them become strong and agile than making them do exercises. The rewards of doing something one enjoys are immediate, and conducive to prolonging the activity itself; whereas the more distant the goal, the greater the imaginative span required to relate present activities to it, the slower the apparent progress, in relation to the whole distance to be traversed, and in general, the weaker the motivation.

For an adult, an excellent learning situation is one in which short-term and long-term motivations are fused; the short-term one being an enjoyment of the learning and doing of mathematics- an intrinsic motivation- and the long-term one being some personal, practical , or academic goal to be achieved with the help of a knowledge of mathematics. But of the two, intrinsic motivation is probably the more important. Some things we learn because we know they are useful. But the major strides which have been made, in mathematics as in the sciences, have resulted from the quest for

knowledge for its own sake. Faraday is said to have replied , to a woman who saw his demonstration of the deflection of a compass needle by a coil of wire through which an electric current was passing and was asked what use that was:'Madam, of what use is a new-born baby?' One characteristic of a baby is that it will grow; another that we cannot predict into what kind of adult; and even Faraday could have hardly guessed at the long-term results of his discovery, whereby the connection between magnetism and electricity was established.

Similarly, a tendency towards growth is an intrinsic quality of the kind of mental organization which we call a schema. That we experience pleasure from any activities which are favorable to their growth is the most powerful incentive to learning, mathematics or any other subject. That the knowledge will afterwards be useful, or in that way, cannot be predicted at the time of learning, any more than when I buy a screwdriver I know exactly what jobs I am going to do with it. When they were studying calculus and algebraic geometry in college, the mathematicians of the American Space Research Program did not know that they would be using their knowledge to plot orbits for a lunar module.

How effective an intrinsic motivation for learning mathematics can be is something which many teachers do not yet appreciate. On a number of occassions, teachers finding that children actually enjoy mathematics when it is intelligently taught and learnt have reported this to me with a mixture of surprise and pleasure, but also of doubt; as if something must be wrong with an approach to mathematics which children enjoyed. But until this intrinsic motivation is better comprehended and put to work, mathematics will remain for many a subject to be endured, no enjoyed; and dropped as soon as the necessary exam results have been achieved.