

THE MOTIVATION OF LIFELONG MATHEMATICS LEARNING

Siti Aishah Hashim Ali

*Open University Malaysia, Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia
ct_aishah@oum.edu.my*

Abstract. As adults, we have always learned throughout our life, but this learning is informal. Now, more career-switchers and career-upgraders who are joining universities for further training are becoming the major group of adult learners. This current situation requires formal education in courses with controlled output. Hence, lifelong learning is seen as a necessity and an opportunity for these adult learners. One characteristic of adult education is that the learners tend to bring with them life experience from their past, especially when learning mathematics. Most of them associate mathematics with the school subjects and unable to recognize the mathematics in their daily practice as mathematics. They normally place a high value on learning mathematics because of its prominent role in their prospective careers, but their learning often requires overcoming personal experience and motivating themselves to learn mathematics again. This paper reports on the study conducted on a group of adult learners currently pursuing their study. The aim of this study is to explore (i) the motivation of the adult learners continuing their study; and (ii) the perception and motivation of these learners in learning mathematics. This paper will take this into account when we discuss learners' perception and motivation to learning mathematics, as interrelated phenomena. Finding from this study will provide helpful insights in understanding the learning process and adaption of adult learners to formal education.

Keywords: adults learning, mathematics, lifelong learning.

INTRODUCTION

In the perspective of lifelong learning, education is experience by adults as a field of tension between felt needs concerning what one wants to learn – or has to learn – and constraints in the form of administrative regulations and financial incentives [1]. Many decades ago, only philosophers and pedagogues discussed the issues of lifelong learning [2]. However, by the end of the 20th century, other parties were also involved in the lifelong learning debates. Lifelong learning became an important aspect of enhancing academic status and solving social and economic problems in industrialized countries. International bodies such as UNESCO, OECD and bodies within the EU declared that education has to be lifelong undertaking [3, 4]. Hence, by early 21st century, education is no longer considered to be a process that ends at the beginning of adulthood or as soon as students leave schools. Education is now a continuous process of acquiring knowledge and skills throughout one's life. Education has become a continuous process of acquiring new or modifying existing knowledge and skills. Lifelong learning occurs to meet the demand of new knowledge, due to working demands or self upgrading, and for maintaining employability. Adult education or lifelong learning is now the societal solution to many conditions arising from rapid economy change.

LIFELONG LEARNING IN MATHEMATICS

Presently, mathematics is at the top of the list of subjects considered as basic skill needed in workers dealing with modern technologies. Mathematical skill is needed when dealing with new technology in workplace, in techniques

and in work organization. Most of the present discussion of lifelong learning does not generally discuss the role of content. Rather, the discussion is normally on phrases such as globalization and technological development, particularly in information technology. In this paper, first we would like to address this simple question: "Why is lifelong mathematics learning important?". To answer this question, let's first look at the role of mathematics in society and technology today:

1. Mathematics is the basis of new technologies and plays a central role in their development. As we know, algorithms are the basis of software and materialized mathematical logic is the basis of computer hardware (microprocessors). Hence, these roles give mathematics a central position in processes going on in highly industrialized countries [5]. In fact, mathematics is the scientific core of the natural sciences and, to an increasing extent, also of social science [6].
2. Mathematics is a tool used to organize our everyday life in society. We used mathematics as a tool in many occupations as well as in making calculated decision. Mathematics is able to provide the tool through mathematical theories and models to a variety of applications and problems solving such as simulating planning in economic, control, automation and construction, politics and social life.
3. Mathematics is a part of our culture. "Democratic principles such as equality, justice and so on need an operational concretization. On the one hand, democracy demands a means for communicating and discussing principles in a rational way. Mathematics, with its close relationship to rationality, is our concept to do this. On the other hand, democracy demands operational procedures for its concrete implementation. Mathematics is again the tool that facilitates this" [5].

Therefore, the role of mathematics in lifelong learning may be taken to be the following:

- Providing the basis of understanding of new technologies, economic progress and industrial development.
- Inculcating mathematics in the structure our everyday life so that mathematics becomes the invisible tool in many workplace routines and daily practices.
- Developing mathematics competency would be valuable for personal development and fulfillment and should become part of our cultural development.

Hence, does adults' mathematics education matter? I believe that it does. Adults' mathematics education is important on the grounds that adults' mathematics has a bearing on their children's mathematics education and mathematics (i.e. numeracy) can be seen as a 'gatekeeper' regulating entry to work. Number skills and logical thinking are among the core elements in many entry-point tests to job entry and promotion/re-training which most workers will have to take and pass during their working lives.

THE STUDY

This study aims at investigating the perception and motivation of adult learners in continuing their studies, especially in mathematics. A total of 200 questionnaires were distributed to participants/learners who are learning mathematics at two levels, diploma and degree programmes. All these learners need to take at least one mathematics course in their programme. The questionnaire items were adapted from existing instruments [7, 8].

All participants are mature or adult learners aged 24 and above and have spent some time away from schools or formal education. This paper only reports on the results pertaining to the motivation of adult learners, particularly in mathematics.

RESULTS AND DISCUSSIONS

First, we looked at the adult learners perception on returning back to college in order to understand the reasons for them to continue their studies. What we would like to know is whether the learners are really interested in pursuing their studies to benefit themselves or they feel that they are being forced to continue their studies. Table 1 gives the results for the motivation of participants towards lifelong learning.

TABLE (1). Motivation towards lifelong learning.

Item	Motivation of learners in lifelong education :	Totally agree	Partially agree
1	For financial gain	43.2 %	41.5 %
2	Higher position in organisation	33.7 %	42.1 %
3	Job threatened	7.2 %	12.3 %
4	Improvement of personal education	71.2 %	20.6 %
5	Acquisition of latest professional knowledge	55.0 %	23.7 %
6	Making career change by learning new skills	19.4 %	23.6 %
7	Enjoy learning new skill/subjects	20.4 %	25.1 %

In general, the scores or frequencies for the categories in this motivation in lifelong learning correlate with the type or level of education that the learners are taking. For example, learners enrolled in diploma programme totally agreed that their motivations for embarking in lifelong learning are “improvement of personal education” (82.5%), “for financial gain” (78.2%), and “making career change by learning new skills” (35.9%). On the other hand, learners embarking on degree programme cited that their motivation is due to obtaining “higher position in organization” (52%), “acquisition of latest professional knowledge” (57.1%), and “enjoy learning new skill/subjects” (41.5%). Similar to the diploma group, this group also agrees that there are motivated to pursue lifelong learning due to “improvement of personal education” (70.1%). Both groups scored low in the “job threatened” as majority of the learners are already working and feel secure with their current jobs. With regards to the learners’ attitude towards learning mathematics, the percentages are shown in Table 2 below.

TABLE (2). Attitude towards learning mathematics.

Item	Motivation towards learning mathematics:	Agree	Disagree
1	always liked solving problems	65 %	16 %
2	always liked memorizing rules	17 %	46 %
3	could never understand math	13 %	72 %
4	terrified of having to study math again	37 %	56 %

5	always hated math because it is too abstract	15 %	69 %
6	always loved math because it stimulate my thinking	42 %	40 %
7	If I can't solve a problem in 10 minutes, I give up	19 %	67 %
8	It is difficult at my age to be a student again	28 %	71 %
9	I was terrified of having to study math again	31 %	57 %
10	I am wiser and more motivated to study math again	46 %	23 %
11	To succeed in math, one has to work hard	86 %	7 %
12	To succeed in math one has to be well organized	71 %	15 %
13	To succeed in math one has to be gifted (born to be good at it)	14 %	69 %
14	To succeed in the course it was necessary to know a lot of math already	47 %	42 %
15	When I entered the course I had poor background knowledge	26 %	52 %
16	In my next math course I'll make sure I understand why the rules work	76 %	3 %
17	I would rather not take mathematics courses if I had a choice	52 %	43 %
18	Mathematics is hard	44 %	57 %

In general, most of these adult learners do not hate mathematics. Though 52% of these adult learners said that they would rather not take mathematics courses if they had a choice, only 31% said that they were terrified of having to study math again. This is probably due to their perception that they could never understand math (13%) and tend to give up when they can't solve a problem in 10 minutes (19%). Some (14%) even thought that to succeed in math, one has to be gifted or born to be good at math. More than half of these learners (69%) have always hated mathematics because it is too abstract. This feeling is supported by their disliked in having to memorize rules (46%) and their perception that mathematics is a hard subject (44%) and they have poor background knowledge (26%). As a result 56% learners said that they are terrified of having to study math again. These perceptions would probably cause low motivation in pursuing mathematics courses.

On the positive note, regarding the learners' attitude towards learning mathematics, a heterogeneous picture emerges:

- They have always been interested in mathematics in school (62% agree)
- They have a good relationship with mathematics teachers (75% agree)
- They have the ability to understand mathematics (57% agree)

This is supported by the finding that most of these learners loved mathematics because they liked solving problems (65%) and mathematics stimulate their thinking (42%). They felt that they are wiser and more motivated to study math again (46%). Hence, the correlation between motivation and claimed ability is high with $R = 0.61$. The learners who are interested in mathematics have ability to understand the subject (80%) and have good relationship with their teachers (83%). 46% of the learners felt that they are wiser and more motivated to study math again and agreed that to succeed in math, one has to work hard (86%) and be well organized

CONCLUSION

This study reveals that majority of adult learners want to pursue or upgrade their education qualification. The learners' motivations for joining and continuing to attend classes are varied and complex. Some are related to perceived needs within their current employment and feeling that they have a skills deficit in their everyday life. Others are joining in order to gain higher qualification and promotion later on.

All the learners that participated in this study have had no formal learning since they left school hence some of them anticipate difficulties in pursuing mathematics courses. They feel that formal learning have occurred a long time ago, whereas they recognized that mathematics learning requires process of abstraction and generalization. This study reveals that the learners' motivations to study mathematics again are correlated to their memories of mathematics learning in school, which for many adults the memories are bad. Generally, these adult learners are motivated to pursue their study and the main triggers are to prove that they can succeed in a subject such as mathematics where they have previously experienced failure; and to improve one's academic qualification for their career advancement.

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