

12th International Congress on Mathematical Education

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Mathematics Education in Cambodia from 1980 to 2012:
Challenges and Perspectives 2025

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The Kingdom of Cambodia was a world leader in technology and scientific understanding from the ninth to the fifteen century as the Khmer Empire. Unfortunately the Pol Pot regime destroyed education system in Cambodia during 1975 to 1979 years. The process of rebuilding the educational system of Cambodia was started by collecting the surviving educated people and by adapting the slogan: “The one who knows more teaches the one who knows less and the latter transfer’s knowledge to illiterates’. Currently Mathematics Education in Cambodia as to face many problems such as lack of well qualified teachers, lack of expertise’s on curriculum development, on text book writing, on methodology of teaching, on use of ICT. No quality assurance mechanism allows improving mathematics education system. As for other matter the low level of salary doesn’t give any motivation to teachers.

In order to solve all current problem existing in Mathematics Education in Cambodia, the Cambodian Mathematical Society (CMS) was established on 4 March 2005 and recognized by the Royal Government of Cambodia to play a part in addressing the development needs. CMS is committed to the enhancement of mathematics as a key “enabling” discipline that underlies other key disciplines and is at the heart of economic, environmental and social development in Cambodia.

Goals for Development of Mathematics in Cambodia:

- *Development of Qualification of Mathematics Teachers*
- *Improvement of the mathematics curriculum at all levels*
- *Preparation of materials for learning, teaching and research*
- *Improvement of the pedagogical methods of teaching mathematics at all levels*
- *Promotion and support of the use of Information, Communication and Technology (ICT) in mathematics education*
- *Encouragement of participation in national and international competition on mathematics*

Key word: Cambodia, mathematics education, teaching skill, information technology, human resource.

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Introduction

From the ninth through the fifteenth centuries, the Kingdom of Cambodia was a world leader in technology and scientific understanding, when it was known as the Khmer Empire. The scientific understanding of our ancestors was very well developed and their appreciation of science was profound. During this time, our intellectuals were world leaders in their knowledge of mathematics, astronomy and other scientific pursuits. Their strong understanding of the natural world was some of the most sophisticated in the world. In fact, the complex system of temples in the Angkor region is recognized by international scholars as the world's largest preindustrial city.

Unfortunately, the progress did not last because of the unrest and war with neighbouring kingdoms. More recently the persecution of intellectuals under the Pol Pot regime from 1975-1979 had a profound impact on the societal and intellectual development of Cambodia. During the Khmer Rouge regime, education was dealt a severe setback, and the great strides made in literacy and in education during the two decades following independence were obliterated systematically. Schools were closed, and educated people and teachers were subjected to particularly harsh treatment; at best, they were exiled or, at worst, they were executed. Soviet sources reported that 90% of all teachers were killed under the Khmer Rouge regime. Only 50 of the 725 university instructors, 207 of the 2,300 secondary school teachers, and 2,717 of the 21,311 primary school teachers survived. During the Khmer revolution, young people were rigidly indoctrinated, but literacy was neglected, and an entire generation of Cambodian children grew up illiterate. After the Khmer Rouge was driven from power, the educational system had to be re-created from almost nothing. Illiteracy had climbed to more than 40%, and most young people under the age of 14 lacked any basic education. The aftermath of this regime resulted in many difficulties, which we still face today.[\[1\]](#)



- Land area: 181,035 Km²
- Provinces/municipals. 24
- Population: 13.5M (2008)
- Household size: 5.1
- GDP per capita: \$912 (2011)

Occupation classification:

- Agriculture 74.2%
- Industry 7.0%

- Services 18.8%
- Literacy rate 73.6%
- Gen. edu. studts: 3,123,082
- Higher edu. studts: 222,146(37.69%F)
- HE students per 100,000P: 1648(2011)
- No. math teacher: 6082
- No. PhD in mathematics: 4

Current Situation of Mathematics Education:

I. Resources

Cambodia allocated around 19% of its annual budget into education to improve its quality. But annual education budget is only 1.6% of GDP. This is very low in comparison with other countries. However, 83% of the funds are allocated to servicing remunerations and operation expenses. That leaves little funds for schools' facilities maintenance and to provide proper teaching materials like computers and internet.[\[2\]](#) There is also insufficient staff in schools, with 58,776 teachers teaching 2,311,107 primary school students and only 27,240 teachers teaching 637,629 lower secondary students. Among these teachers only 6,082 are involved in mathematics education and they will teach 18h00 per week and 38 weeks per academic year. They teach 7h00 per class per week at grade 1 to grade 3, 6h00 per class per week at grade 4 to grade 10, 8h00 per class per week at grade 11 and grade 12 for students study advance mathematics, and only 4h00 per class per week if students study basic mathematics. The teacher-pupil ratio is thus very high and results in inefficiency. In addition, over 60% of the primary and secondary school teachers received at most secondary education, which thus compromises the quality of education.[\[3\]](#).

The percentage of population in each age group attending an educational institution is shown in Table 1, indicating that only approximately 14.37% of the population can afford to pursue tertiary education:

Table 1

Age	<6	6-14	15-19	20-24	25+
% attending	28.91%	80.19%	51.83%	14.37%	1.20%

II. Policy implementation

Provisional/Municipal Offices of Education (POE) are responsible for supporting the ministry in implementing educational policies, for preparing and submitting plans for further development of education, and for providing data and statistics of schools. However, there is a lack of congruence between research and policy making, linked possibly to the inadequacy of budget and research facilities, which exemplifies the weakness in analytical research and development for its educational system. As a result, there exists a significant gap between policy formation, implementation and

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monitoring within the educational system that does not target the specific problems in which both the educators (mathematics teachers) and children face.

III. Gender disparity

Although the literacy rate and the number of girls graduating from primary school in Cambodia are increasing, the number of girls who drop out from secondary education is much higher than the number of boys. In 2008, the fraction of girls to boys in upper secondary is 75% and only 50% in tertiary education. This disparity can be partly attributed to the higher opportunity cost of sending girls to school as there will be one less helping hand to earn an extra income. The trade-off between school participation and economic activity increases as the child gets older and this trend is particularly prevailing among girls. In 2008, 23% of young women were illiterate compared to 16% of men. Among the Cambodians who do obtain an education, there is still significant gender disparity in Mathematical literacy. Only 15% of mathematics students at Khemarak University are women.

IV. Tertiary Education

In 2009, Cambodia had a tertiary enrollment rate of 10%, which appears to be low when compared with other nations. [6] Of those students, only 1.5% study mathematics. Students in other specialties take very little mathematics. For example in Biology, Chemistry, and Social Science, they take only 45h00 on calculus. Moreover, Cambodia's higher education institution lacks world recognition and is currently not acknowledged by Quality System World University Rankings. There is also inadequate communication between schools and corporations. This thus hinders the necessary adjustment of the curriculum of mathematics to equip the students with skills to meet the demand of the labor market. [5].

V. Poverty Hindering Education

The poverty line in the rural areas of Cambodia is set at US\$1 per person per daily consumption. But minimum daily food requirements cost at least US\$2.5. [6] Due to poverty, children in Cambodia are forced to give up the chance of receiving education in order to work and supplement the family's income.

VI. Mathematics Teachers

Teachers in Cambodia are earning merely US\$40 to US\$150 a month. In capital city, monthly living expenses for a family of four average US\$500. Due to the shortage of teachers in Cambodia, teachers employed often lack proper training and also experience a high student-teacher ratio in the classes. Most teachers in Cambodia, especially those in the more remote areas have not even completed their secondary education. Given that of a fast growing youthful population in Cambodia [7], if

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teachers are required to possess a certain minimum qualification, the problem of teacher shortage will be more severe.

The obstacles of mathematics teachers in Cambodia are:

1. Lack of opportunities for teachers to learn new curriculum, knowledge and skills
2. No mechanism to motivate them to update knowledge and skills themselves – e.g., promotion criteria.
3. Low salary and low social status of teachers.

Therefore, the typical characteristics of Mathematics teachers in Cambodia are:

1. Minimal knowledge of mathematical content, and pedagogy.
2. Lack of motivation to upgrade and update themselves.
3. Low research capacity of higher education teachers.

VII. Lack of Resources

Due to a lack of resources and minimum government funding for schools in Cambodia, there is a shortage of teaching material and school facilities. According to UNESCO, merely 1.6% of Cambodia's GDP (Gross Domestic Product) is spent on education.:[\[6\]](#) Even though the Cambodian government promises to provide \$1.50 - \$1.75 per student per year to each primary school for teaching materials and school operating costs, the sum is often insufficient to even cover the basic operational cost of the schools [\[6\]](#). Clearly no funds are available for instructional technology. The vast array of technology such as graphing calculators, Maple, MathCad and Mathematica are not available to Cambodian students, teachers and researchers.

VIII. Curriculum and Mathematics textbook

The curriculum of mathematics has developed every ten/five years, written by experienced local teachers with abroad expertise assistance. Local writers don't have specialist in field of mathematics curriculum development.

The text book used in Cambodian schools are written by experienced local teachers. As we already discussed these teachers are not qualified for this job. The characteristics of text book are:

1. The text books contain mathematical errors. Less experienced teachers do not recognize these mistakes and teach the incorrect mathematics to the students.
2. Text book updates do not reflect modern educational psychology and pedagogy

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3. Teachers' guides are not widely available. There is a lack of reference books for teachers in Khmer. Almost teachers can only speak, read and write Khmer.
4. Text printed only in black and white. They do not contain the high quality color graphics typically found in other countries' text books.
5. There is weak linkage between the contents and the daily lives.

IX. School administration and mathematics management

The typical characteristics of school administration and mathematics management are:

1. Weak vision of educational leadership and management.
2. Low contribution from communities and private sector in Cambodia.
3. Lack of school networking development, sharing experience and best practices or success story.

MATHEMATICS EDUCATION 2025 PERSPECTIVE

The Cambodian Mathematics Society was established on 4 March 2005 and recognized by the Royal Government of Cambodia to play a part in addressing the development needs. Its goals are:

1. To gather mathematicians, lecturers and teachers of mathematics to discuss current mathematical issues and how to solve them in order to develop the society.
2. To advance the quality of mathematical knowledge, both for application and for education, update curricula and text books, and promote innovative teaching methodology
3. To easily communicate with international centres and the outside society in order to support the Cambodian Mathematical Society.

The goals for Development of Mathematics in Cambodia from 2013 to 2025:

1. Develop of Quality of Mathematics Teachers:
 - Build the capacity of mathematics teachers for all levels in Cambodia through the provision of training programs.
 - Increase the number of PhD. in Mathematics from 4 to 50 in 10 years. These people will provide the necessary intellectual leadership and management.
 - Increase the number M.Sc. in Mathematics, both pure and applied, from 60 to 500 in 10 years.
 - Increase the number B.Sc. in Mathematics, both pure and applied, from 2000 to 5000 in 10 years.
 - Increase the quality of education at all levels.

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2. Prepare materials for students and teachers involved in research and publishing. This will involve identifying and engaging: authors, writers and publishers to assemble experienced mathematics teachers who have these skills technology experts for recording VCD-DVD materials reporters and news analysts for magazine publications.

3. Improve the methodology of teaching mathematics at all levels to adapt the modern pedagogy by using technology and ICT.

4. Improve the mathematics curriculum at all levels, especially Masters and PhD. programs, through the development of curriculum materials suitable for all grades, by holding workshops for the exchange of ideas enhancing mathematics teaching methods for all grades. This activity is mainly concentrated at the six Regional Teacher Training Centres and the 18 Provincial Teacher Training Centres through one-week training courses, or longer training programs of up to three months to build mathematical knowledge and teaching competence.

5. Promote and support the use of ICT in mathematics education.

6. Form a committee for the establishment of a national mathematics competition. The national committee will be composed of members from provincial / city locations and the relevant institutions, and will prepare entry requirements for the encouragement of capable students.

CONCLUSION

The Cambodian Mathematical Society is committed to the enhancement of mathematics as a key “enabling” discipline that underlies other key disciplines and is at the heart of economic, environmental and social development in Cambodia.

Although progress has been made through the society and through the support from national and international agencies, there are significant challenges ahead in embedding mathematics education into the curriculum for all Cambodian students. Consequently the committee will continue to advocate strongly for international support and partnerships in this important mission. As an outcome of the work of the society it is anticipated that:

- Mathematics teachers at all levels within the system will have enhanced knowledge and expertise in mathematics education.
- Students will have access to relevant learning materials, including texts in Khmer.

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- The mathematics curriculum will be relevant to the needs of students and communities, will be aligned with science and technology, and will enjoy similar attention to other curriculum areas.
- There will be an enhanced interest in, and commitment to, mathematics education by students, researchers and potential mathematics teachers.

References

- [1]. Russell R. Ross, ed. "Education". Cambodia: A Country Study. Research completed December 1987.
- [2].C. Tan (2010) Education trajectory in an era of globalization, UNESCO, pg 7
- [3]. C.Y. Kim & M. Rouse (2011) Reviewing the role of teachers in achieving education for all in Cambodia, UNESCO, pg 6-7
- [4].Than, Chhay. "Cambodia Human Development Report 2000, Children and Employment".Ministry of Planning, Royal Government of Cambodia.
- [5]. Chealy, C.(2009). "Higher Education in Cambodia".In Y. Hirosato and Y. Kitamura (eds.) The Political Economy of Educational Reforms and Capacity Development in Southeast Asia. Netherlands: Springer, pp. 153-165.
- [6]. http://en.wikipedia.org/wiki/Education_in_Cambodia
- [7]. Education Statistics & Indicators 2011-2012, EMIS Office, Department of Planning, Phnom Penh, February 2012 (Supported by UNICEF/Sida)