ACCESS-QUALITY MODEL IN HIGHER EDUCATION

Jennifer W. Tan and Rowena A. Decena
Northwestern Mindanao State College of Science and Technology
Labuyo, Tangub City

ABSTRACT

The paper examines two (2) models for the relationship of Access to and Quality of Public Higher Education in the Philippines. The first model is the usual Feed Forward Quality Model where the inputs, processes, and outcomes of higher education are taken as sequential elements in the educative process. The second model is the Feedback Quality Model where the academic processes of an institution dictate the quality of inputs; further, the inputs go through the academic processes of the institution to produce a desired level of quality. Findings show that the Feedback Quality Model best fits the Philippine situation. The desired quality level is represented by the Philippine institutions which are highly competitive (selective admission-selective retention policies). Within this category, access is maximized by increasing retention rates through appropriate investments in the quality of the academic processes: faculty, facilities, curriculum, and student services. From the current state of Open Admission-Selective Retention of the public higher education institutions, the State needs to quadruple its investments on public higher education institutions if it wants to reach the ideal quality levels.

Keywords: model, rejection rates, access, quality, retention rates, feedback quality model

Introduction

Expansion of access to quality higher education has become a universal concern for developing and developed countries all over the world. Earlier greater emphasis was given to educational expansion and access to free basic education but the tremendous growth in school enrollment which eventually flows to higher education has shifted plans and policies calling for a higher quality of education at the tertiary level. This concern has become a thematic concern in the developed as well as in the developing countries, in those that have attained high access as well as in those still striving for access. In fact, it has now been established that access and quality are not sequential elements, and a number of international organizations have visualized the

role of quality as being instrumental in improving access (UNESCO 2003, UNESCO 2005). In contrast, quality and access (equity) have often been viewed as being conflictual (Adams, 1997) in that pre-occupation with access in education negates the achievement of excellence. In the latter view, any improvement in school quality (Q) would induce a corresponding decrease in access (A) (Aspin and Chapman, 1994). Most of the top-ranked universities in both developing and developed countries are inaccessible to the average students precisely because of the rigorous admission standards imposed by these universities. However, proponents of the counter-view posit that since quality lies in providing excellence in all forms, equity and access would imply that all students get the opportunity to develop to their fullest extent. Thus, equity and access would be subsumed under quality and excellence (Aspin et al., 1994).

The differences in views about the relationship of access and quality in education can be traced back to the difficulty in defining "quality" in education and to make such definition be universally accepted. Current practice defines the quality of a school or educational program as some combination of inputs, processes, and outcomes (Reddy, 2007). This practice is succinctly demonstrated in the following definitions which reflect the varying emphasis and interpretations of the term: a.) UNICEF (2000) has defined quality in terms of five dimensions (learners, safe environment, relevant curriculum, child-centered teaching and well-managed classrooms, and outcomes); b.) Fuller (1986) states that quality is defined in terms of the level of material inputs allocated to schools per pupil, the level of efficiency with which a fixed amount of material inputs are organized and managed to raise pupil achievement; c) Adams (1997) considers educational quality as high if existing students achieve many of the curriculum objectives. In the Philippines, the definition of quality has shifted from inputs and process based on outcomes-based typology.

A focal issue in the discussions on school quality concerns the object of quality measurement. This considers which aspects of educational performance should enter the overall specification of quality. As of now, discussions have focused on input, process and outcome dimensions. For the greater majority, quality in schools is predominantly about outcomes. The obvious argument avers that the quality of schools should be calibrated against the achievement of its students rather than from its resources - financial, physical or human. Moreover, for the primary stakeholders of the educative process, namely, the parents, the chief indicator of the quality of a school is the guarantee of some sort of employability. They, however, also look at educational growth in terms of non-tangible qualities, such as respect

for others, tolerance, and discipline that lead to the betterment of the individual. However, what needs to be noted here is that attention to educational outcomes does not imply downgrading the *determinants* that lead to them. Hence, *an approach to improving quality that does not focus on the links between inputs, processes, and outcomes* is bound to fail. (OECD 1989). That is, final outcomes of the educative process will only be of quality if the inputs and processes that lead to them are of quality.

The importance of quality in higher education is nowhere more emphasized than by the establishment of the Commission on the Future of Higher Education, otherwise known as the Spelling's Commission in 2005 in the United States of America. The nineteen-member commission was charged with recommending a national strategy for transforming post-secondary education, with a particular emphasis on how well colleges and universities are preparing students for the 21st-century workplace, as well as a secondary emphasis on how well high schools are preparing the students for post-secondary education. Among the significant findings and recommendations of the Commission in 2006 were:

Higher education access "is unduly limited by the complex interplay of inadequate preparation, lack of information about college opportunities, and persistent financial barriers" (Commission Report 5). The commission identifies the lack of formal dialogues between colleges and high schools as one aspect of the problem. The report noted the discrepancy that "forty-four percent of university faculty members say students are not well prepared for college-level writing, in contrast to the 90 percent of high school teachers who think they are prepared" and "only 17 percent of seniors are considered proficient in mathematics, and just 36 percent are proficient in reading." To this end, the Commission endorsed the idea of linking the expectations of universities and colleges for incoming freshman to the basic competencies required for students to graduate from high school by enhancing the channels between the two groups. In order to accomplish this, the Report "strongly encourages early assessment initiatives that determine whether students are on track for college". Moreover, the Report advocates an increase in the use of open content and open source at the collegiate level to increase access to more people.

The report encourages colleges and universities to utilize innovative ideas for new methods of teaching, such as non-traditional learning or e-learning, to improve the quality of higher education. The report also addresses the idea that organization and nation-wide reform are key parts in solving the problems of higher education. University curricula need to be

modified to be more attuned to industry requirements while national standard assessments would help distinguish students in the academic world.

Another problem that the commission addresses regarding access to higher education is the participation rate for low-income families and, to a lesser extent, students of minority groups. The report states that "there is ample evidence that qualified young people from families of modest means are far less likely to go to college than their affluent peers with similar qualifications." The report demonstrates that greater productivity and efficiency of the financial aid system would alleviate the problem significantly. As in the case worldwide, State funding for higher education has fallen to the lowest levels in two decades, and the report proposes that Universities be held accountable for their "spending decisions... based on their own limited resources."

This paper attempts to develop a national model for access to and quality of public higher education in the Philippines.

Model Development

We develop two (2) types of socio-economic models for balancing access (A) and quality (Q) consideration in higher education, namely the Feed Forward Model and the Dynamic Feedback Quality Model. After the models are developed, we proceeded to validate them with actual data to determine which one best captures the Philippine higher education context.

1.1 Feed Forward Model. In the feed-forward model, we assume that the components of inputs, processes, and outcomes are sequentially ordered like in the classical quality model (OECD, 1989). Inputs influence processes which in turn influence the quality of outcomes. The quality of inputs is captured by the variable called Student Selectivity (Rejection Rate). The higher is the institution's student selectivity, the better are the quality of inputs. The quality of institutional academic processes is represented by its ability to keep the students until they finish their degree programs (Retention Rates). Retention rates are determined by the quality of faculty, learning environment, efficiency in the use of resources (Fuller, 1986) so that institutions with more qualified faculty, safer and better facilities, more relevant curricular offerings and more efficient use of resources will eventually retain their students (who, in the first place, had been highly selected in the beginning) until they graduate from their respective degree programs:

Student Selectivity = g(rejection rate)

Retention Rate = f(faculty, facilities, curriculum, efficiency)

The quality of the final outcomes of the institution is determined by their average passing rate in licensure examinations:

Final Outcome = h(licensure examination)

Combining all these representations, we obtain the feed-forward model of quality as:

Final outcome = h (f(g(rejection rate)))

Figure 1 shows the Feed Forward Model of Quality:

Figure 1. Feed Forward Quality Model

That is, the final outcome is a function of the retention rate and rejection rate of the institution. We note that higher rejection rates imply that access to education is minimized while higher retention rates promote access to education. These access-quality relationships are illustrated in figure 2:
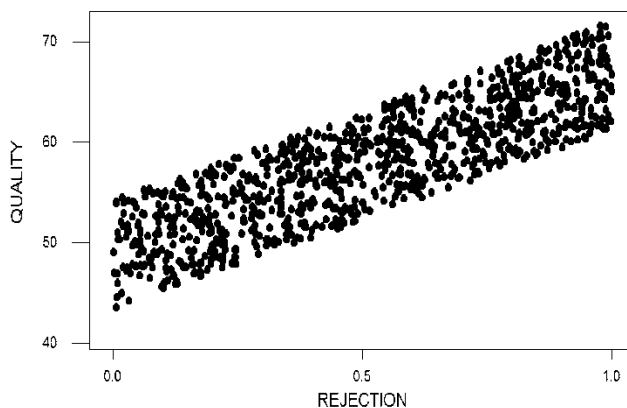

Figure 2. Relationship Between Quality and Rejection (Student Selectivity)
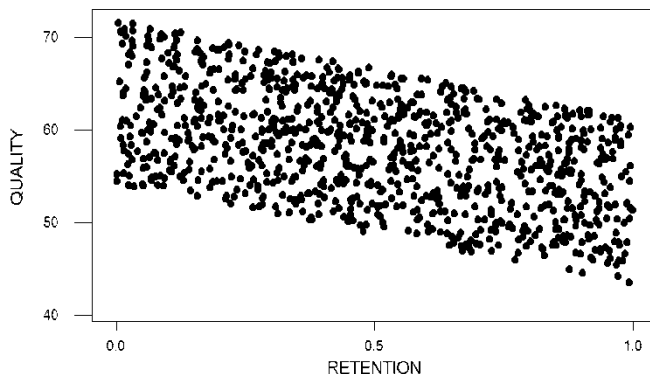
Figure 3. Relationship Between Quality and Retention (Quality Processes)

Figure 2 shows that as student selectivity increases (higher rejection rates), quality correspondingly increases. However, we also note that for each rejection rate, there exists an upper and a lower bound for quality. For example, for a 50% rejection rate, the lower bound for quality is about 48% while the upper bound could go as high as 60%. That is, for an institution that rejects 50% of its applicants, the expected licensure examination performance could potentially range from 49% to 60% passing rate. Meanwhile, Figure 3 illustrates an inverse relationship between quality and retention rates; the higher the retention rate, the lower becomes the quality. Again, for each rejection rate, there exists a band representing the lower and upper bounds for quality. It is this quality band that one might exploit to maximize quality given a fixed level of access (or conversely, maximize access given a fixed level of quality).

These observations lead to the following categories of institutional types in the Philippine setting:

The rejection rate represents the HEI's student selectivity; the higher this rate is, the more selective is the institution. One school of thought in higher education supports the idea that the quality of graduates in higher education is, to a large extent, determined by the quality of student inputs into the system. More popularly known in information technology as the GI-GO principle (Garbage in- Garbage out), this notion implies that there is very little that a school can do to inputs who are not ready to face the rigors of higher education. Likewise, high student selectivity adheres to the idea that

higher education constitutes the smallest segment of the entire education pyramid; the majority of high school graduates is better prepared to be trained in acquiring employable skills than in academic-scholastic training. Thus, of about 2 million high school graduates in the Philippines, only 10% or 400,000 students are prepared for college work (DepEd 2013). The rejection rate of the university is defined as the ratio of the number of students who do not qualify for admission to the total number of the applicant.

Retention rate or the ability of the HEI to keep admitted students in the institution to complete their degree programs embodies the quality (Q) of the educational experiences that a student obtains in the institution. Removing the various reasons for dropping out of school, higher education institutions, with excellent faculty, facilities and resources, good curricula, and excellent student services, are expected to have high retention rates. In other words, the combined effects of excellent faculty, facilities and resources, curricula and student services, produce good to excellent retention factor. In a cohort, the retention rate is defined as the number of students who successfully complete their higher education degrees to the initial number of students who get admitted into the HEI's in that cohort group.

Finally, the national passing average of the HEI's in licensure examinations represents the visible output measure of the quality of the HEI's. In many studies, the institution's passing rates in various licensure examinations were, in fact, used as a surrogate measure of quality. The principle hold by researchers supporting this measure of quality is that the graduates' performances in national standardized tests reflect the institutions' quality of instruction. Of course, other educational researchers contend that the students' performances in licensure examination are mainly attributable to the students' abilities than the institutions' capability to train them.

A three-dimensional quality model is derived from these three (3) variables as illustrated in the figures below

Process

	High	**Low**
Input High		
Low	Output	

Figure A. Two-Dimensional Quality Model

Retention Rate

		High	Low
Rejection Rate	High	Selective Admission – High Retention	Selective Admission – Low Retention
	Low	Open Admission – High Retention	Open Admission – Selective Retention

Figure B. Empirical Quality Model

The empirical quality model (EQM) in Figure B shows four (4) categories of quality:

Category 1: Selective Admission – High Retention Institutions. These are Philippines HEI's which are very selective in their first-year entrants but strive hard to keep the "cream of crop" in the school system until they finish their degree programs. We call these institutions the "Ideal Quality" models for the Philippines.

Category 2: Selective Admission – Low Retention Institutions. These are Philippines HEI's which despite the rigid screening done to select their incoming freshmen, take deliberate measures to further screen the students to ensure quality graduates. We call these institutions the "Highly Competitive Quality" models for the Philippines.

Category 3. Open Admission – High Retention Institutions. These are Philippines HEI's which admit most of the high school graduates who apply for entrance and yet, ensure that most of them finish their college degrees (no failing marks policy). We call these institutions the "Mass Quality" models for the Philippines.

Category 4. Open Admission – Selective Retention Institutions. These are Philippine HEI's which admit most of the high school graduates seeking a student place in the institution but, once in, the institutions establish measures to screen them so that only the best will graduate from their degree programs. We call these institutions the "Typical Quality" models for the Philippines.

1.2 Access. Access to higher education does not only mean being admitted to a college or university but more importantly, access implies the successful completion of a degree. This notion of access is, therefore, inextricably linked with the multi-dimensional quality model earlier presented. Thus, for the Ideal Quality Model (selective admission – high retention), access is minimized at the start, but maximized in the process and at the end of the cycle; for the Highly Competitive Quality Model (selective admission – low retention), access is minimized at the beginning and further minimized in the process. Likewise, for the Mass Quality Model (open admission – high retention) ensures open access to higher education and maximizes it in the process as well. Meanwhile, the Typical Quality Model (open admission – selective retention) adheres for open access to higher education but minimizes it in the process.

1.3 Dynamic Feedback Quality Model. In this model, the same inputs, processes, and outcomes parameters are considered. However, the input variable, namely, student selectivity is not arbitrarily set by the institution but is a function of the society's perceptions of the institution. That is when society perceives the institutional processes as of high quality, then the student selectivity (or rejection rates) of the institution is determined. For instance, the University of the Philippines has built a reputation of being of high quality so that a rejection rate of over 80% is accepted by society. This dynamic feedback model is illustrated below:

Figure 4. Dynamic Feedback Quality Model

The interaction between the quality of the academic processes of the institution and the input process of student selection is illustrated graphically below
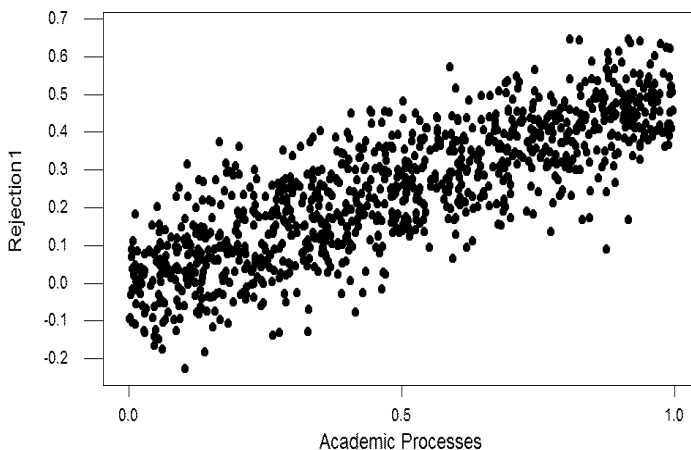
Figure 5. Interaction of the Quality of Academic Processes and Quality of Inputs in the Dynamic Feedback Quality Model

Figure 5 shows that as society's perceptions on the quality of the academic process of an institution increase, tolerance for higher rejection rates increases as well. For instance, for the Typical Quality Institution when public perceptions of the quality of academic processes are somewhere in the 50% range, acceptable rejection rates range from 5% to 35% (i.e. the institution adopts an almost open admission policy). The quality parameters in the dynamic feedback quality model are related as follows:

Student Selectivity = f(academic processes or retention rates)
Final Outcome   = g(f(retention rates)

1.4 Optimization Model. We now wish to define clearly the optimization model that is useful in the Philippine context. The model is anchored as the following assumptions:

A1: Only 20% of the graduating high school students have the scholastic aptitude for university studies;

A2: High rejection rates imply high student selectivity and conversely;

A3: The combination of rejection and retention defines the quality of an HEI. High rejection rates in tandem with high retention rates imply that the quality components of faculty, facilities and resources are well in place in that HEI so that highly selected students are properly assisted in completing their college degrees;

A4: On the other hand, low rejection rates in tandem with high retention rates imply that something is wrong with at least one of the quality components of faculty, facilities, and curriculum resources in that HEI because it is unable to distinguish between "good" and "not good" graduates;

A5: High rejection rates in combination with low retention rates imply that highly selected students are further reduced by the HEI's curricular processes indicating that the components of quality, faculty, facilities and curriculum resources are interacting properly to produce high-quality graduates.

A6: Finally, low rejection rates coupled with low retention rates imply that the school compensates for the absence of quality control at the stage by its highly selective retention methods.

We define:

(A) … Rej = 1, if percentage of rejection is 80% or higher
         = -1, else
     Ret = 1, if percentage of survival is greater or equal to 90%
         = -1, else
     Q   = average over the last three (3) years of passing rates in
     board examinations.

and we contend a linear model of the form:

(B) … $Qij = "\mu.. + (Rej)i + (Ret)j + (Rej \times Ret)ij + \varepsilon \, \varepsilon ij$

where $\varepsilon \, \varepsilon ij$ are random normal errors. We then seek the model that satisfies:

(C)   Min: Z = Rej (maximize access)
        Subject to:
             $Q \geq q_o$ (quality constraint)

The solution to (C) can be found in the quality categories 1 to 4.

Numerical Illustrations

We provide numerical illustrations of the model to (a) determine how the quality categories figure in relation to the surrogate measure of quality categories figure in relation to the surrogate measure of quality (passing in the Licensure Exam for Teachers from 2012 to 2014); and (b) solve the optimization problem (c) of section 2.

The data used in these illustrations are obtained from the published results of the Professional Regulation Commission (PRC, 2012 – 2014); Commission on Higher Education Data Base (CHED 2012) and the General Appropriations Act 2014.

Four (4) schools were randomly chosen for each cell of the two-by-two Quality Table. Table 1 shows the average over the last three (3) years of the HEI's sampled.

Table 1. Means and SD's of HEI's In the LET: 2012-2014

		Retention Rate	
		High (+)	Low (-)
Rejection Rate	High (+)		Mean = 94.78 SD = 6.39
	Low (-)	Mean = 24.16 SD = 15.18	Mean = 48.11 SD = 17.29

Tabular values reveal that there is a high agreement between the quality categories and the outcome measure of quality (board exam). In particular, the Highly Competitive Quality schools obtained an average of 94.78% with a standard deviation of 6.39%. These are the HEI's with high student selectivity and low retention factor i.e. competitive grading system. Institutions with open admission policies and a no-fail mark policy were the least performers (mean 24.16% and SD=15.18%.) These are the institutions that adhere to mass higher education.

Table 2 shows the two-way analysis of variance model for quality as empirically tested by actual data:

Table 2. General Linear Model for Quality

Quality = 54.2 + 17.5 Rej − 10.80 Ret

Predictor	Coef	SE Coef	T	P
Constant	54.205	4.728	11.46	0.000
Rej	17.502	5.061	3.46	0.004
Ret	-10.811	5.417	-2.00	0.067

S = 16.15   R-Sq = 74.2%

Quality varies directly with rejection rates and inversely with retention rates. That is, as an institution becomes more selective in their students, quality tends to increase. However, as the evaluation process within the educative process becomes lax, quality deteriorates.

Subject to the constraint that the quality of the institutions falls in Highly Competitive Quality Model, the optimal access factor is obtained when the rejection rate is set at a mean of 80% with a standard deviation of 9.13%. The optimal rejection range, based on actual data to belong to this category of schools, is from 70% to 90%.

Policy Lessons

Two (2) state universities were found to belong to the Highly Competitive Quality Model. One (1) had a gross per capita student cost of roughly P140, 000.00 per year, while the other registered a gross per capita cost of about P42, 335.10 per year. The figures were obtained from the Current Operating Expenditures (COE) of the SUCs in the General Appropriations Act of 2014. The former school registered an average of 98.67% passing rate in LET while the other had 85.24%. These figures imply that the marginal rate of cost per unit quality in this category of school is:

(D) $MRC = \frac{140,000 - 42,335.10}{98.67 - 85.24} = \frac{97,665}{13.43} = P\ 7,272.15/Q$

These suggest that public investments for quality higher education are uneven and indicative of gross external inefficiencies in the system. That is, to develop SUCs in the Philippines to be in the category of Highly Competitive, the range of per capita investment is extremely wide (from P40, 000 per student to P140, 000 per student per year).

Meanwhile, schools belonging to the Mass Quality Category (Open Admission – High Retention) registered an average gross per capita cost per student of P 13, 430 per year and an average passing rate of 24.16%. Thus, for schools in this category to reach the quality level of the schools in the high-end of quality, the state needs to invest at least four (4) times their current budgets and making sure that these budgets go to the major components of quality: faculty, facilities, curriculum and resources and student services/assistance.

For higher education programs and policies that tackle the issues of quality and access, the following information can be useful:

- The quality of educational outcomes in highly dependent on the quality of students entering the universities. Producing high quality, competitive graduates in higher education is far more cost-effective when the universities are highly selective in their student inputs;
- The major process components of quality, namely: faculty, facilities and resources and student services, interact dynamically to produce the desired quality outputs through a retention mechanism that acts as quality assurance for the schools. Moreover, the quality of the educational processes dictates the extent to which a University can be highly selective in their student inputs. The most current retention rate information for public higher education institutions is provided by the National Statistical Coordination Board (NSCB,2005) as shown below:

Table 3. Ratio of Graduates vis-a-vis Enrollees (matched)[1]

A. PUBLIC

Academic Year		Enrollees[^]				Graduates[^^]				% of Grad to Enrollees		
Enrolled	Graduated	Male	Female	Public Total	% to Total	Male	Female	Public Total	% to Total	Male	Female	Public Total
1994-1995	1997-1998	162,541	237,082	399,623	21.4	33,640	48,590	82,230	26.8	20.7	20.5	20.6
1995-1996	1998-1999	197,295	290,194	487,489	24.2	36,566	57,272	93,838	28.0	18.5	19.7	19.2
1996-1997	1999-2000	225,514	324,956	550,470	26.7	40,954	64,060	105,014	29.9	18.2	19.7	19.1
1997-1998	2000-2001	224,276	318,674	542,950	26.3	44,780	70,807	115,587	31.8	20.0	22.2	21.3
1998-1999	2001-2002	272,191	383,438	655,629	28.8	50,999	80,492	131,491	34.3	18.7	21.0	20.1
1999-2000	2002-2003	300,468	416,977	717,445	30.2	56,499	88,673	145,172	36.1	18.8	21.3	20.2
2000-2001	2003-2004	325,296	445,866	771,162	31.7	55,583	84,868	140,451	36.3	17.1	19.0	18.2
2001-2002		335,138	473,183	808,321	32.8							
2002-2003		340,921	474,674	815,595	33.6							
2003-2004		349,405	479,776	829,181	34.3							
2004-2005		348,581	470,670	819,251	34.1							

The retention rates fall roughly in the range of 18.2% to 21.3%, which according to the Dynamic Feedback Quality Model, should have resulted in

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an open-admission policy (around 10%-30% rejection rate) and licensure outcomes in the range 54% to 58%. These figures matched closely with the predicted ranges of quality for the Open Admission-Selected Retention public higher education institutions (Table 1). This situation is quite far from the ideal quality level desired for Philippine universities.

- The ideal quality level for Philippine universities is represented by the Highly Competitive Quality Model characterized by their high student selectively and judicious retention policies. The Dynamic Feedback Quality Model provides information on the optimal retention rates (and therefore of the quality of the academic processes) for institutions to belong to this category, namely:

Optimal Retention Rate = 39% to 42%

Roughly translated, this means that the quality of the academic processes of the higher education institutions should be doubled to reach the desired competitive quality state.

- To achieve this ideal quality level, the state needs to invest four (4) times more for the state institutions belonging to the average or Typical Quality Model (open admission − selective retention) of SUCs.
- The optimal range of access to quality higher education in the Philippine setting lies between 70% to 90% rejection range (or admitting the top 10% to 30% of graduating high school students).

In line with the current programs of the Commission on Higher Education this information may help sharpen the targets of:

1. **Student Financial Assistance Program (STUFAP)** needs to target the top 30% of graduating high school students for financial assistance.
2. **Normative Financing,** needs to even out the huge variance that exists in the funding of SUCs resulting in uneven quality outputs. SUCs should be at the High-Quality Model by 2016 and this means accounting for the marginal rate of cost per unit quality for most of the SUCs.
3. **Faculty Development.** The SUC faculty promotion and Ranking System (NBC #461) should be directed more towards quality teaching and research. The Commission on the Future of Higher Education (2006) averred that the Universities need to produce more

innovative and discovery research in order to impact on the public's perception of their quality.

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