

CHALLENGES FACING THE OPEN UNIVERSITY: THE CASE OF THE KOREA NATIONAL OPEN UNIVERSITY

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ABSTRACT

Although the KNOU has successful history, it has been in a difficult situation, recently. By comparing the statistical figures of the university in the early 1990s and 2000s, we can delineate the followings as the major difficulties. First, there was a sharp decrease in the number of the applicants and students. Second, there was a continuous downward trend of the enrollment rate of the admitted students. Third, there were feminization and aging of the student population. Forth, the academic departments with students less than the quotas increased and the gaps in student numbers between the department widened. In terms of policy implications to the Open Universities, we propose the followings based on the experiences of the KNOU: we should maintain the number of students within a reasonable limit; the Open University needs to do its best to improve quality in education.

Key words: applicant, enrollment rate, demographic change, quality in education

One of the remarkable characteristics in South Korea's contemporary education is the speed of growth in the number of students and swift upward movements of the advance rate of the graduates. In the 2003 academic year, 80 percent of high school graduates advanced to a university or college. Since the 1980s and the early 1990s, lower secondary education and upper secondary education, respectively, have reached full participation. This means that South Korea is in the era of universal higher education.

In terms of quantitative growth, the Korea National Open University (KNOU) has outperformed conventional universities in Korea. Both in terms of number of the students and the graduates KNOU is by far the largest university in Korea; it boasts its success with its 300,000 graduates and 200,000 enrolled students.

However, a close observation reveals that the KNOU is in a situation confronting tough challenges since the early 2000s. The challenges come from such changes as the decreases in the number of applicants and student enrollment, the drop of the enrollment rate of the admitted students, the widening gap in the number of students between the major departments and minor departments.

In this paper, we will analyze the environmental changes in the KNOU since the early 1990s, and delineate the major challenges to the KNOU. After that, we will present major circumstantial changes and the effects of the KNOU's policies that made the challenges serious. Finally, we conclude with some policy recommendations that can be meaningful to the KNOU and the open universities in other countries, as well.

RECENT CHALLENGES TO THE KNOU

Decrease in number of the applicants and students

The number of the applicants to the KNOU has sharply decreased since the early 1990s. The applicants for freshmen plummeted to 45,000 in 2004, which was half the number of the applicants of 94,000 in 1994, and only a third of its all-time high of 121,000 in 1992. Even though the number of applicants for sophomores and juniors have increased a little recently, the total yearly applicants decreased by around 56,000, from 16,600 in 1993 to 11,000 in 2004.

Table 1. Number of yearly applicants to the KNOU (thousand persons)

Year	Freshmen	Sophomores	Juniors	Total
1991	80	14	20	114
1992	121	14	30	165
1993	114	21	31	166
1994	94	15	38	147
1995	60	14	39	113
1996	71	17	46	134
1997	67	16	38	121
1998	52	17	36	105
1999	68	23	54	145
2000	63	20	50	133
2001	67	22	53	142
2002	62	23	51	136
2003	52	20	49	121
2004	45	19	46	110

Note: extra-regular applicants are not included

Downward trend of the enrollment rate

The enrollment rate, meaning the rate of the enrolled students out of the admitted ones, has been decreasing for the last 10 years. In 1994, the enrollment rate of freshmen was 85 percent. In 1999, the rate fell to 79 percent; fell further in 2004 to 76 percent.

As the result of the drop of the applicants and enrollment rate, the total number of students enrolled has been diminishing. The total number of students is 183,475 in the first semester of 2004, which is a decrease by about 20,000 compared to the enrolled student of 206,084 in 1994.

Table 2. Enrollment rates of freshmen (thousand persons, %)

	1994	1999	2004
Admitted	69,070	63,011	44,978
Enrolled	58,364	49,735	34,117
Enrollment rate	84.5	78.9	75.9

The retention rate, defined as the percentage of the enrollments in the second semester divided by those in the first semester, has increased about 5 percentage points by the KNOU's launch of reenrollment drive to the long-term absentees. The enrollments are in the downward trend, however, both in the first and second semester.

Table 3. Trends in the number of students between semesters and the retention rate

	1994	2004
Enrollments in the first semester	206,084	183,475
Enrollments in the second semester	139,407	132,571
Retention rate (%)	67.6	72.3

Feminization and aging of the students

With the decrease in the number of students, there have been changes in the composition of students. First of all, more and more female students entered the university and they became the majority since the early 1990s. Two out of three students are female in 2004.

Table 4. Trends in the composition of the students by gender (%)

	1989	1994	1999	2004
Male	54.9	43.2	37.7	33.1
Female	45.1	56.8	62.3	66.9

Second, there was the aging of the student population. In the early 1990s, more than half of the students were in their twenties. Now, two out of three students are in their thirties or over. The median age of the students turned to 33 in the early 2000s from 27 in the early 1990s.

Table 5. Trends in the composition of the students by age groups (%)

Age	1994	1999	2004
20 or less	4.8	3.2	0.8
21-29	61.2	51.2	32.7
30-39	26.9	33.5	44.4
40 or over	7.1	12.1	22.1

Third, the number of students with no jobs has increased. The proportion of the students employed with full-time jobs among the newly enrolled freshmen diminished to 55 percent in 2003 from 80 percent in 1993. On the contrary, students who are unemployed or occupied with domestic work increased to 45 percent in 2003 from 20 percent in 1993.

Table 6. Compositions of the newly enrolled students by the occupational positions

		1993	2003
Freshmen	Employed	79.8	55.0
	Housewives	5.7	23.4
	Others (including the unemployed)	14.5	21.6
Sophomores or juniors	Employed	76.8	73.1
	Housewives	3.7	8.6
	Others (including the unemployed)	19.5	18.3

Increase of the academic departments with students less than the quotas and the widening gaps in student numbers between the departments

The KNOU assumed that the minimum quota of students in a department should be 2,000. In 1994, all but one department had more than 2,000 newly enrolled freshmen. In 2004, however, 12 among 21 departments recruited less than 2,000 freshmen. Seven departments even failed to recruit 1,000 freshmen.

As a result of the increase of the departments falling short of the minimum quota, the gaps in the enrolled students between the so-called popular departments and non-popular ones have widened for the last ten years. In 1994, the number of freshmen enrolled in the largest department was 6,125, about 3 times the number of 1,872 enrolled in the smallest department. In 2004, the number of freshmen in the largest department is 36 times as large as the number of freshmen in the smallest department (See Figure 1).

BACKGROUND OF THE CHANGES

Roots of the changes

There were several environmental factors and policy blunders, at least from our point of view, which aggravated these challenges. Those are the decrease in number of adolescents by the demographic change; growth of the students in the conventional universities; and the KNOU's policy of prioritizing the size of the student population, etc.

Demographic change in Korea

In the early 1990s, Korea rapidly got into an aging society. This demographic change would be the first reason for the change in the applicants and students. As shown in Table 7, the population in the ages of 20-29 in Korea has been dwindling since the early 90s, in terms of the numbers and the proportions among the whole population. Contrary to this, the population in the ages of 30-39 and 40-49 has been increased in the same period. As the number of youngsters in Korea has decreased, so has the population that could be potential students in the KNOU decreased.

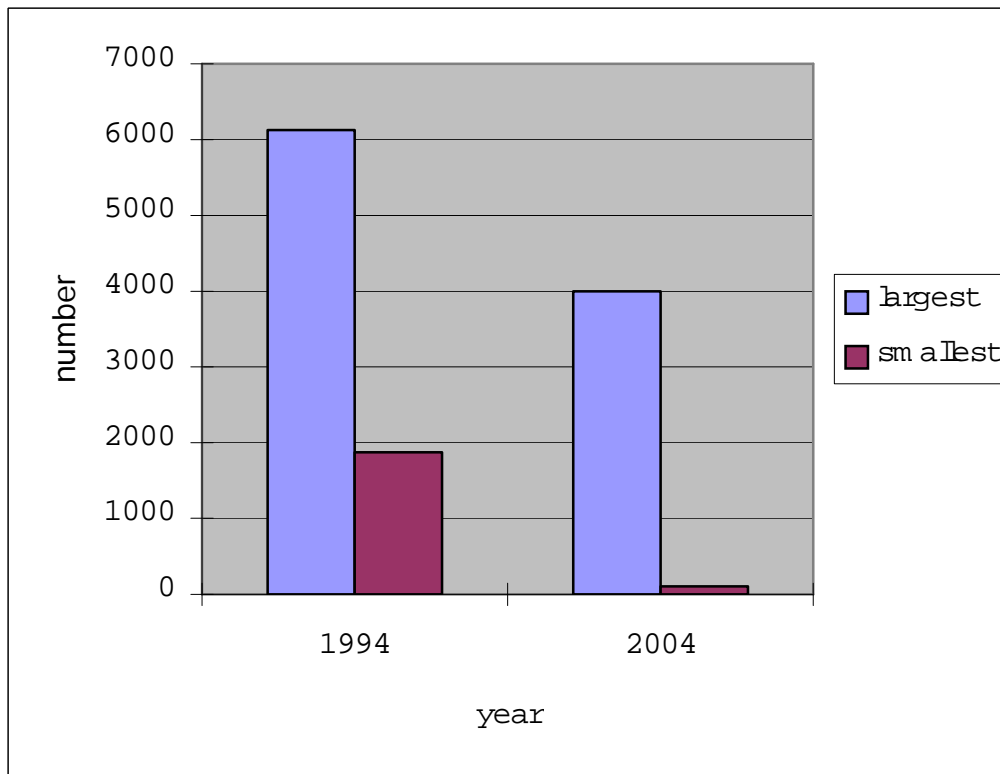


Figure 1. Gaps in the number of freshmen

Table 7. Number and proportion of Korean population by age groups (thousand persons, %)

	20-29	30-39	40-49	Total
89	8,551(20.1)	6,772(16.0)	4,638(10.9)	42,449(100.0)
94	8,728(19.6)	8,278(18.5)	5,132(11.5)	44,642(100.0)
99	8,272(17.7)	8,507(18.2)	6,576(14.1)	46,617(100.0)
04	7,809 (16.2)	8,576 (17.8)	8,084 (16.8)	48,199(100.0)

Source: Korea National Statistical Office.

Increase of the students in the conventional universities and colleges

The number of students in the conventional universities and colleges has been increasing dramatically since the early 1970s. It was made possible by rapid increases in founding new universities and increased student quotas to the existing universities and colleges. As shown in Table 8, the graduates of four-year university jumped to 50,000 in 1980 from 23,500 in 1970. In 2000, the number grew as large as 214,000, more than four times the number in 1980. In 2003, the graduates of junior colleges and four-year universities increased 2 times and 1.4 times, respectively, as the graduates in 1993.

Table 8. Number of the yearly graduates

	High school	Junior college	University
1970	145,062	-	23,515
1980	467,388	-	49,735
1990	761,922	-	165,916
1993	722,451	111,855	184,868
2000	764,712	223,489	214,498
2002	670,713	239,114	244,852
2003	590,413	246,789	258,126

Note: - means no available data

Source: Ministry of Education & Human Resources Development, Statistical Yearbook of Education, Each year

As the number of students in the conventional universities and colleges grew in the midst of the declining in the number of high school-graduates, the rate of the advancement of the high school graduates to the conventional universities and colleges rapidly ascended since the early 1990s. Table 9 shows that the advance rate rocketed to 80 percent in the 2003 from 33 percent in the early 1990s. The higher the advance rate of high school-graduates, the less the number of potential applicants for the KNOU.

Table 9. Number of high school graduates and their advance rates to higher education level

	Number of high school graduates (thousand persons)	Advance rate (%)
1991	754	33.2
1992	740	34.3
1993	722	38.4
1994	688	45.3
1995	650	51.4
1996	670	54.9
1997	672	60.1
1998	737	63.5
1999	748	66.6
2000	765	68.0
2001	736	70.5
2002	671	74.2
2003	590	79.7

Source: Ministry of Education & Human Resources Development, Statistical Yearbook of Education, Each year

Added to the growing number of students in the conventional universities, the Education Ministry permitted foundation of the cyber universities that were supposed to deliver lectures via the Internet only. In 2000, 7 cyber universities with the total entrance quota of 5,600 were established. In 2003, the number increased to 16 universities with the total entrance quota of 23,850.

KNOU's policy: Expansion of the entrance quota and the establishment of new departments

The KNOU has placed its policy priority to mass education since the early 1990s. Basically, it has a penchant for a large student size on the basis of open education for everyone.

Furthermore, it wished to make the best of the circumstance by enlarging the magnitude of the university. Partly, it was the result of the submission to the government's request of enlarging the student population. Since the early 1980s, the government had been under pressure to enlarge the entrance quota of the universities, as there was huge number of repeaters preparing for the university entrance exam.

As shown in Table 10, the KNOU had 9 academic departments with entrance quota of 30,000 in 1982, when it turned to a degree-awarding university. Its entrance quota had inflated to 49,000 in 1990, to 64,000 in 1991, and to 69,000 in 1992. The entrance quota in the early 1990 was more than 3 times as large as the quota in 1982. The quota continued to increase until it reached 70,500 in 1997, and decreased a bit, reaching 66,400 in 1999. Number of academic departments also grew continuously from 9 in 1982 to 16 in the early 1990s. It currently has 21 departments.

Table 10. Expansions of the entrance quota and departments

Year	Newly Established Departments	Number of Dept.	Quota ⁺⁺ (thousand)
1982	English, Law, Public Administration, Economics, Business Management, Agriculture, Household Management, Primary Education*, Infant Education**	9	30
1983	Computer Science	10	31
1984	Korean Studies, Chinese Studies, French,	13	33
1985		13	34
1990	Education*	13	49
1991		13	64
1992	International Trade, Information Statistics, Environmental Health & Nursing ⁺	16	69
1994		16	67.5
1996	Media Arts	17	68.5
1997	Japanese Studies	18	70.5
1999		18	66.4
2004	Tourism, Culture & Liberal Arts, Environmental Health ⁺ , Nursing ⁺	21	66.4

Note:

- * The Department of Primary Education ceased to admit new students in 1990 and changed the name to Department of Education.
- ** Up to 1989, the Department of Infant Education offered associate-degree courses and offered degree courses since 1990.
- + Environmental Health & Nursing divide into two independent departments in 2004.
- ++ Quotas in the years not mentioned in the table are same as the respective previous years

The KNOU has churned out increasing number of graduates after the influx of the students since the middle 1990s. Up to 1990, the total number of graduates reached about 66,000, which means annual average of 8,000. As shown in Table 11, however, the number of the annual graduates was increased to more than 10,000 since 1991, to more than 15,000 since 1996, and to more than 22,000 since 1999 for the next four years. The annual graduates in 2001 and 2002 even outnumbered the total graduates of all the universities in Korea in 1970. It has become a sort of 'degree mill', literally.

Table 11. Number of graduates from the KNOU

	-1990	1991	1992	1993	1994	1995	1996	1997
Number	65,649	11,007	10,384	10,604	10,039	13,517	15,909	16,988
	1998	1999	2000	2001	2002	2003	Total	
Number	19,189	23,424	22,551	26,730	25,565	18,725	290,281	

EFFECTS OF THE CHANGES AND POLICY TO THE KNOU

In Korea, up to the early 1980s, many of the youngsters even with high cognitive ability could not go on to colleges or universities. It was mainly because they were poorly off; there were few colleges and universities in the country; and the entrance quotas of the colleges and universities were not large enough. Consequently, there were high school graduates who became managers or technicians by self-study or on-the-job training in the workplaces among the first generation of the industrialization. As a result, a big discrepancy between the people's roles and positions in the workplaces appeared and their educational qualifications.

In addition to that, the need for technological and managerial knowledge had been augmented by the industrialization of Korea. Furthermore, the growth of the university graduates by the foundation of new universities in the 1970s had reinforced the demand for university education. As an increasing proportion of the country's youngsters went on to universities, the possession of a Bachelor's degree has become an indispensable passport to a decent job (Park, 1995). It was the huge increase in the demand for post-secondary education in Korea that made the government establish and expand the KNOU.

Many of the KNOU's students and graduates in its early years were people who were eager to improve themselves with Bachelor degrees (Park, 1995). Thanks to those students' diligence, eagerness and determination to improve them through learning in the KNOU, the reputation of the KNOU and its graduates remained good.

The expansion in the number of students in the early 1990s changed all that. With regard to the quality and reputation of education in the KNOU, the huge increase of the students had three effects. First, the quality of education and the prestige of the university were prone to deteriorate. In practice, although additional staff was recruited with the increase of the students and departments, the number was not large enough to handle the entire burden brought by the expansion. In addition to that, it made the KNOU's image worse, as people had natural disposition to believe that there was a trade-off between quantity and quality in education.

Second is the harmful effect of the expansion to staff in the university. The influx of the applicants in recent years has given an illusion of success and prosperity to the staff. Self-complacent of the success of the university's education model, the constituents of the university were not so keen for improving quality in education and services for the students.

Third, the influx of the students for several years has rapidly dried up the resources of potential students, especially the students with high abilities and preferable jobs. Freshmen applicants of less than 60,000 in 2003 and 2004, despite the entrance quota of more than 66,000, mean that almost all the applicants for the freshmen are admitted. In this situation, there should be many applicants with low academic bent and ability. It is especially so, considering the yearly dropout rates of the students in the middle schools and high schools in Korea as low as 1 percent and 2 percent, respectively, and the advance rate of the high school graduates as high as 80 percent.

Degradation of the university's reputation has reinforced the change in the composition and behaviors of the students from bad to worse. Partly, owing to the easiness to go on to the university, females in their thirties or forties flooded to the university. Basically, they are less concerned about the university's status as they are not so keen to have jobs. They wished to learn the 'light' subjects suitable to their feminine taste offered in the departments like Korean Studies, English, Japanese Studies, Household management, Education, Infant Education, etc.

We could also recognize the students' dissatisfaction with the university's status by the behaviors of the students and graduates. One is the high rate of dropout, and the other is high rate of transferring students in the KNOU. According to a survey on the KNOU's incumbent students in 2003, 31 percent of the respondents replied that they would like to transfer to the conventional universities after graduation. In 2004, there were 107,000 enrolled students out of possible population of 263,000, mainly the incumbents and the students on leave of absent, which means high dropout rate of 59 percent. Arguably, there are several important reasons for this high dropout rate, one of which must be the concerns over the university's status. The biggest reason of the dropout is, presumably, voluntary quitting of the students who use KNOU as an intermediary to transfer to conventional universities.

In addition to this, there are more and more students who pursue further degrees. In 2000 alone, there were 4,325 graduates who advanced to graduate schools to get a Master's degree. It is more than 2 times as large as the number of graduates who advanced to graduate schools in 1992, which was 1,340. Concerning the postgraduate study, the survey on 2003 incumbent students shows that 34 percent of the respondents replied that they had a plan to go on to a graduate school after their graduation from the KNOU. We deemed that quite a large portion of these graduates chose to enter post-graduate schools to compensate their Bachelor's degrees with a Master's degree.

CONCLUSION

With regard to the attitudes of the prospective applicants for the KNOU, we would like to point out the role of the degree as a signaling device (Spencer, 1973). When there was small

number of degree-holders in the country, a degree awarded from whatever university functioned as a signal of a worker with a good quality. Once attending college or university became the norm, however, people wanted to ensure that their own degree was awarded by a prestigious university rather than the unknown college down the road, conscious that not a degree but the status of a university had become a sorting machine for employers.

In terms of quality in education, the KNOU has been run under the assumption that distance education is no less effective than classroom teaching in the conventional universities. Some of the active proponents of the distance learning in the university have even contended that by delivering lectures using advanced information technology like the TV and Internet, distance education could be more effective than education in the conventional universities. However, the behavior of prospective applicants and the students who got admitted to the KNOU since the early 2000s revealed otherwise: the applicants for the freshmen has diminished, year in year out since 2001, notwithstanding the low tuitions in the KNOU.¹ They were concerned and dissatisfied about quality and reputation of the university.

Students in Korea were not the only ones who shied away distance education. When Unext, based in Illinois U.S., founded the online-only Cardean University in 2000, it recruited professors from the University of Chicago, Stanford University, and the London School of Economics (LSE) to develop course materials including video clips, animation, self-assessments, and interactive electronic discussions. However, it had fewer than 500 students, much less than expected at first, enrolled in its MBA program. As a result, the payroll, excluding faculty, shrunk from more than 400 to about 100. Payout agreements to the university partners were restructured and many of Cardean's marketing staff were fired (Maeroff, 2003).

NYUOnline offered online versions of New York University courses since 1998 in conjunction with the university's School of Continuing and Professional Studies in such areas as real estate, hotel management, risk assessment, and publishing, etc. These are the areas in which NUY had already established a firm reputation in the classroom. The university shut down NYUonline and declared the cyber program dead in November 2001 (Maeroff, 2003). Lastly, Fathom, a for-profit company mainly sponsored by Columbia University offered free and paid-for material from such diverse sources as Columbia, LSE, Cambridge University Press, and the British Museum. But after spending \$30m, Columbia wasn't seeing enough returns on its investment, and in January 2003, announced that Fathom would be shut down.² These cases show distance education has not succeeded, yet, even in the prestigious universities' MBA courses.

People's disposition on university's status is different by the country. In Europe, egalitarianism is firmly established: people would 'pretend' that all universities were created equal (Economist, 1997). In the U.S., by contrast, colleges and universities are ranked according to

¹ Student's tuitions in the KNOU are a tenth of those of the students' in a conventional public university, or a twentieth of those in a private university in Korea.

² http://www.economist.com/business/globalexecutive/education/displayStory.cfm?story_id=1762562

status (Pot, 2000: 143). There are gaps in salaries according to the status of colleges and universities from which employees attained their degrees. In the case of Korea, there are implicit rankings of the major universities. Although the salaries of newly recruited university graduates in a company are, in general, same regardless of the status of universities, the graduates of prestigious universities are in preferable positions in the labor market, as they are more likely to be employed and promoted.

The difference of people's disposition on 'equality' of university education between the U.S. and the UK must be one of the major reasons why the two Open Universities in these countries have had opposite destinies. The United States Open University began operating in the fall of 2000 as a not-for-profit private university providing part-time distance education to adults whose jobs or families prevent them from pursuing full-time study. The tuition was \$200 per credit hour for undergraduate courses (including materials, instruction, technology fee and any applicable sales tax). In the U.S. Open University, those directly involved to the students were associate faculty, each of who was assigned to handle up to 25 students in a section. The associate faculty, who mostly had jobs at other institutions, supported the learning of the students by tutoring and mentoring the students via the Internet. As the university delivered the education packages developed in the British Open University, its sister institution, after minor modifications to make them adaptable in the U. S., the quality of the contents must be in the top-notch. However, the university ceased to exist by the lack of students and insufficient funds (Maeroff, 2003: 35-38).

The Internet, long regarded as a blessing to students in a distance education can be a misfortune for the institutions. Online education is not exclusively for the Open University. Online education will penetrate deeper in the conventional colleges and universities as broadband use becomes widespread, especially in Korea where more than 70 percent of households are thought to have broadband. As a result, the gap in quality of education between distance and conventional universities can even be widened, as the students and teachers can communicate not in classroom, but at any time in any place. Furthermore, as the Internet enables to overcome the barriers of classroom walls, it becomes easier for the conventional universities to recruit adult students who have jobs or family responsibilities.

In addition to that, the government's policy of prioritizing quality in higher education could have an ill effect in recruiting more students in future. In July 2004, the Korea's Education minister said that the ministry would cut the entrance quotas of the conventional public universities to improve quality at public universities by reducing the students-teacher ratio to 21 to 1 until the year of 2009, from 31 to 1 in 2003.

What can we learn from the experience of the KNOU? First, it is the importance of maintaining the number of students within a reasonable limit. Any government in democratic countries would fret about increasing students in universities to make the voters happy. Increasing the entrance quota in the open universities would be an easy way for this, as it was not supposed to need much additional expenditures. In the case of the KNOU, it should have refused the government's request to increase the quota; although it would not be that easy for the university as it had been subsidized by the government. However, drastic expansion of the

student quota without the proportional increases in the personnel and facilities for them, at least, have brought two hazards to the university that could be a serious drag in future: rapid drying up of the pool of the prospective applicants; degrading of the university's prestige. The increased students and graduates have ill-affected university's prestige in four ways: people's perception that mass education is harmful to quality; overstretching of staff's capacities to the administrative tasks; influx of students with low academic ability and bent; and neglect of university in improving quality.

Second, the Open University needs to do its best to improve quality in education. Not indulging in the illusion that large number of students guarantees prosperous university with successful future, it should always concentrate in improving quality. Among the various jobs for improving quality of education, we would focus on making quality contents and textbooks.³ It is a task of extreme difficulty to prepare an excellent education packages suitable for all the students, as the students at the Open University are more diverse in age and experience, in academic bent, and in socio-economic status and cultural background than those in the conventional universities. Furthermore, employers are ever more demanding, sometimes expressing contradictory demands on the skills and knowledge of university graduates. Sometimes they want the graduates to have practical talent usable on the spot; at other times they complain about the graduate's ignorance of basic principles and the lack of adaptability to changes in new circumstances. In times of permanent change, open universities should make the contents that are rich enough to satisfy both demands. For this, the teachers should be concentrating to one or two subjects so as to keep up with changes and developments of each discipline, and to deliver it successfully by making it easy to understand for all the students.

Emphasizing the quality rather than the number of students in higher education is becoming a worldwide phenomenon, nowadays. Even Mr. Schroeder, the Chancellor of Germany, where equality of universities has been steadfastly entrenched, has urged the creation of ten new elite universities (Economist, 2004). With the spread of this trend, students are more concerned about the prestige of their qualifications and the status of the institutions from which degrees were awarded (Wolf, 2002). As the Open University is not in a position to neglect the trend, we should make every effort for this.

REFERENCES

- Economist. (2004). Who pays to study? *The Economist*, January 22nd, 2004.
- Economist. (1997). All must have degrees, Survey: Universities. *The Economist*, October 2nd 1997.
- Maeroff, G. I. (2003). *A Classroom of one: How online learning is changing our schools and colleges*, New York: Palgrave Macmillan.

³ The success of Britain's Open University is known to owe much to education packages of best quality, the network of regional tutors and the on-campus summer schools that complement the distance-learning element. As the KNOU has been delivering classroom lectures since its foundation, we focus on the development of state-of-the-art packages and texts, here.

- Newman, F. (2002). *Competition and market forces: higher education enters the maelstrom of transformation, the future project*.
<http://www.futuresproject.org/publications/publications.html>)
- Park, D. J. (1995). The role of Korea Air and correspondence University in the human resource development in Korea, *paper presented to the 17th World Conference for Distance Education in Birmingham, Britain*, organized by the ICDE.
- Phipps, R., & Merisotis, J. (1999, April). *What's the difference?* Washington, D.C.: Institute for Higher Education Policy.
- Pot, F. (2000). *Employment relations and national culture: Continuity and change in the age of globalization*. Cheltenham: Edward Elgar.
- Simonson, M., Smaldino, S., Albright, M., & Zvacek, S. (2000). *Teaching and learning at a distance: Foundations of distance education*, Upper Saddle River, N.J.: Prentice Hall.
- Spencer, M. (1973, August). Job Market Signalin. *Quarterly Journal of Economics*, 87, 355-74.
- Wolf, A. (2002). *Does education matter? : Myths about education and economic growth*. London: Penguin.