Case study 3

The Norsk Course:
the upper secondary curriculum taught at a distance by NKS Distance Education in Oslo/Norway

The course covers the upper secondary school curriculum. The target group consists of adults who want to complete their secondary education in order to qualify for higher education. The course therefore comprises years 1 to 3 of the upper secondary school. Since the course is treated as equivalent to three years of conventional upper-level secondary education, the student learning hours (SLH) are estimated on this basis. The course extends over 5+5+4 = 14 hours per week in each of the three years of its duration. The school year has about 40 weeks. Hence the number of SLH is 40 x 14 = 560 per year. The following calculations refer to one year.

The number of students recruited so far is 418. The number expected for the lifetime of the course is 1 500. We calculate the average cost per student for both cases.

Resource media: inputs and costs

There are resource inputs of print and video. The inputs were standardised in unit equivalents (UE). A UE (print) = 50 pages and a UE (video) = E60, i.e. a one-hour cassette. For both types of resource material we classify the costs in terms of fixed costs of development and variable costs of production. The variable costs in both cases were calculated on the basis of the projected total enrolment.

The resource material consists of printed material and videocassettes. The printed material specifically developed for the course consists of three booklets. In addition to the print material developed by NKS a set of textbooks is provided called 'Bruer' (bridges). The textbooks are to be purchased by the students. The video input consists of 12 video sequences of 10 to 15 minutes.

Print

The printed material developed for the course consists of 10 sections of a total of about 420 pages which is equal to 8.5 unit equivalents of print. Following the cost classification of NKS for the cost of development we distinguish author-related costs ('Redaksion') which include costs for authoring, consultancy, linguistic and pedagogic advice and design-related costs ('Grafisc') which include setting, layout, cover design and pre-print. The bulk of the author-related costs, about 65%, consists of fees for authors.

Table CS 3.1: Resource inputs and their costs: print

Inputs and type of costs		Cost £'95
No of UE	8.50	
No of copies	1 500	
Development costs		
Author related		11 910
Design related		2 113
Subtotal: fixed costs of development		14 023
Production costs		11 634
Total		25 657

Source: NKS data

From table CS 3.1 we can conclude that the cost for development of a UE (print) is as follows:

$$\text{cost/UE(print)} = \frac{£14\,023}{8.50} = £1\,650$$

The variable cost per student due to replication of the material (unit cost of production) comes to

$$\text{Unit cost of production} = \frac{£11\,634}{1500} = £7.80$$

In addition to the print material developed in-house, additional sets of textbooks were bought in and given to students. The unit cost of a set amounts to £ 85.

Video

The video input provided consisted of 12 video sequences of 10 to 15 minutes, which amounts to 3 UE (video), or 3xE60. The fixed costs of development came to £62 506. The fixed cost of development for a UE (video) therefore is £62 506/3 = £20 835. The variable cost of production per student (unit cost) is £8 415/1 500 = £5.60.

Table CS 3.2: Resource inputs and their costs: video

Inputs and type of costs		Cost £'95
No of E60	5.60	
No of copies	1 500	
Development costs (fixed)		62 506
Production costs (variable)		8 415
Total		70 921

Source: NKS data; cost £'95

Student support and costs: inputs and costs

There were no face-to-face tutorials. The support consisted of tutor-marked assignments (TMAs) and provision made for telephone tutorials.

Tutor marked assignments

Since students take external exams, the submission of TMAs is voluntary. Students are given the opportunity to submit up to 10 assignments, which would be commented on and marked by a tutor. The cost per assignment is calculated according to the following formula:

Table CS 3.3: The cost structure of TMAs

tutor marking fee	x social cost factor	+ handling cost	= assignment cost
£5.65	x 1.3	+ £0.81	= £8.16

Source: NKS data; cost £'95

Student participation is voluntary and, in fact, quite low. It is described in table CS 3.4. It is based on the student participation so far (based on the sample of the 418 students enrolled so far). Out of the maximum of 418 x 10 assignments only 901, i.e. 22% were submitted so far. Based on this participation rate we expect the total cost due to TMAs to be 22% x 1 500 x 10 x £8.16 = £26 928.

Table CS 3.4: Cost of tutor-marked assignments (TMA)

No. of TMA offered	1	2	3	4	5	6	7	8	9	10	0
No. of students who have done the respective no of TMA	84	31	19	13	4	16	7	11	7	33	193
No. TMA completed	84	62	57	52	20	96	49	88	63	330	0
Cost per TMA (subtotals)	685	506	465	424	163	783	400	718	514	2693	0
Total TMA cost	7 352										

Source: NKS data; cost £'95; Note: total no of students here 418, i.e. the students so far recruited

Telephone

In addition to interaction through marked assignments, students may telephone their tutors for clarification. It seems, however, that most of the content-related telephone advice is handled by NKS staff, either in the customer services department or in education. Though tutors theoretically can claim cost for giving content-related advice, no claims have been made so far which indicates that students turn for advice rather to NKS staff rather than to tutors. Unfortunately, the extent to

which student make use of the telephone to seek content clarification is not documented. However, NKS management judges it to be quite modest.

Administration

The enrolment costs per student were given as £1.70 and the administrative mailing as £4. The table calculates the total costs incurred in the direct administration of the course both based on the number of students participating so far and on the predicted number.

Table CS 3.5: Actual and projected administrative costs

	No of students	Enrolment cost	Mailing costs	Total costs
based on sample	418	711	1 672	2 383
based on projection	1 500	2 550	6 000	8 550

Source: NKS data; cost £'95

Cost analysis

The cost analysis consists of a summary of the direct course costs, a determination of the average cost per student (and the respective cost function) and finally the cost per student learning hour.

We are now able to draw together all the direct course costs so far. The costs are re-classified as fixed and variable costs in order to allow us to derive the average cost function in the next section.

Total direct costs

The information can also be displayed in terms of the total cost function, which sums up the fixed and variable cost. (F represents the total fixed costs and V x s the total variable cost. V in itself stands for the variable cost per student or the unit cost; when multiplied by the number of students we arrive at the total variable cost.)

Table CS 3.6: Student support and costs: inputs and costs: summary of direct costs

Total direct cost	Based on sample	Based on projection
Fixed costs		
Development cost print	14 023	14 023
Development cost video	62 506	62 506
Subtotal fixed costs	76 529	76 529
Variable cost		
Production cost print	3 242[a]	11 634
Production cost video	2 341	8 400
Bought in books	35 530	127 500
Assignments	7 352	2 6928
Mailing	1 672	6 000
Enrolment	711	2 550
Subtotal variable costs	50 848	183 012
Total costs	127 377	259 541

Source: NKS data; cost £'95. Notes: a: since the material was printed for the projected number of 1500 students we divided the production cost by the corresponding proportion of the sample enrolled.

Given this notation we have:

For $s = 418$

$$TC = £\,76\,529 + £\,50\,848 = £\,127\,377$$

For $s = 1\,500$

$$TC = £\,76\,529 + £\,183\,012 = £\,259\,541$$

Average cost per student

The total cost equation above allows us to determine the average cost per student.

$$V = \frac{£\,50\,848}{418} = \frac{£\,183\,023}{1500} = £\,122$$

TC = F + V x s can be transformed into AC = F/s + V where V stands for the unit costs. We calculate AC for s = 1500 since this will be the average cost per student at the time the course terminates. The average cost function therefore is

$$AC = \frac{£\,76\,529}{s} + £\,122$$

For s = 418

$$AC = \frac{£\,76\,529}{418} + £\,122 = £\,183 + £\,122 = £\,305$$

For s = 1 500

$$AC = \frac{£\,76\,529}{1\,500} + £\,122 = £\,51 + £\,122 = £\,173$$

Average cost per successful student

Students of NKS take public exams. Therefore from the point of view of NKS, completion rate could be defined as the percentage of students who have completed all their assignments successfully. Using this standard, the completion rate is low at between 10% and 20%. A better standard would be the number of students who passed their exams. But this information is not accessible by NKS because of the data protection laws, which excludes NKS from such access. However, it is known from surveys that about 55% students are confident enough to sit for the exams. Informal discussion with NKS staff suggested a pass rate of 50%, which would mean that of an original cohort of 1500 students (50/100 x 55/100 x 1500) or 412 students will get the qualification. If we then attribute the fixed costs to the successful students (and effectively write off the variable costs for unsuccessful students) we get an average cost per student of AC = £76,529/412 + £122 = £186 + £102 = £308.

Cost per student learning hour

The overall number of student learning hours generated by the course was 560. Therefore we get:

$$\text{cost/SLH(course)} = \frac{£\,76\,529}{560} = £\,137$$

To calculate the cost of development for all the resource material against the student learning hours, for which the material provides, we have:

$$\text{cost/SLH(media)} = \frac{£\,76\,529}{88} = £\,870$$

We have, however, to draw attention to the role of the bought-in material (the set of textbooks mentioned in the introduction). Most of the learning time is not developed at the fixed costs

indicated since much is bought in. A more reliable measure is the cost per learning time by medium based on the actual amount of text and the time of video developed.

We use the following conversion conventions: A UE(print) it taken to provide study material for 10 hours, hence 1 UE(print) = 10 SLH. In case of video we identify the learning time with the exposition time, hence: 1 UE(video) = 1 SLH. We then can compare the cost per student learning hour:

$$\text{cost/SLH(print)} = \frac{£\,14\,023}{8.5 \text{ x } 10} = £\,165$$

$$\text{cost/SLH(video)} = \frac{£\,62\,502}{3} = £\,20\,835$$

This suggests that it costs about 120 times as much to generate a student learning hour video than it costs to generate a student learning hour print. Obviously such costs are only indicative. It costs more to make a carefully presented video, which necessitates the deployment of a film crew than filming a lecture.