Costing Scenario for "Growth and Sustainable Development"

Sarah Felber

University of Maryland University College

Graduate Department of Education

OMDE 606 Costs and Economics of Distance Education & E-learning

Costing Scenario for "Growth and Sustainable Development"

1. **Figure 1: Classification of costs**

Row Number/Cost (Ingredients Spreadsheet)	Fixed or (semi)variable?	Capital or Recurrent?
3 – manager (ongoing)	fixed*	recurrent
4 – management support (ongoing)	fixed*	recurrent
8 – manager (development)	fixed	capital
9 – management support (development)	fixed	capital
12 – study guide content development	fixed	capital
13 – study guide layout and design	fixed	capital
15 – podcasts content development	fixed	capital
16 – podcasts editing	fixed	capital
17 – syllabus	fixed	capital
18 – discussion prompts	fixed	capital
19 – assignments	fixed	capital
22 – content development (maintenance)	fixed	capital
23 – layout and design (maintenance)	fixed	capital
27 – online discussion	semi-variable	recurrent
29 – marking assignments (essay)	variable	recurrent
30 – marking assignments (spreadsheet)	variable	recurrent
31 – marking assignments (collaborative)	variable	recurrent
32 – printing costs	variable	recurrent
33 - postage	variable	recurrent

*We treat these items as fixed, but they could be semi-variable in a real situation. If the number of students enrolled at one time becomes large enough, additional managers or managerial support staff could be required to interact with faculty and students (UMUC, n.d., Module 2 Unit 10).

Fixed costs are those that do not depend upon the number of students taking the course. Variable costs do depend upon the number of students taking the course. Capital costs are those related to items that have value over multiple financial periods. Recurrent costs, or operating costs, are those related to items whose value exists only in the financial period in which they are incurred, and therefore recur as long as the course is offered and the item is needed (UMUC, n.d., Module 2 Unit 3).

2. Recurrent fixed costs of course overheads include the manager and managerial support. These total $55,000, as calculated in cell F5 of the Ingredients spreadsheet.

3. The aggregate fixed costs of development include managerial and managerial support time, and costs to develop course materials. These total $50,570, as calculated in cell F20 of the Ingredients spreadsheet.

The aggregate fixed costs of maintenance include costs to update content and layout/design. These total $700, as calculated in cell F24 of the Ingredients spreadsheet.

4. The variable cost per student includes the delivery costs of online discussions, marking assignments, printing, and postage. These total $238, as calculated in cell F34 of the Ingredients spreadsheet.

5. Because the course is offered for seven years, the depreciation rate for fixed costs of course development is 1/7, or approximately 14.3%. $7224 of the fixed costs of development are charged to each of the seven years.

   After maintenance, the modified course is offered for three years, making the depreciation rate for fixed costs of maintenance 1/3, or approximately 33%. $233 of the fixed costs of maintenance are charged to each of the three years.

6. At a 2% interest rate, the fixed costs of development annualized over seven years come to $7814 per year.

   Calculation:

   $$a(.02, 7) = \frac{r(1+r)^n}{(1+r)^n - 1}$$

<div align="right">(UMUC, n.d. Module 2 Unit 6)</div>

   $$a(.02, 7) = \frac{.02(1+.02)^7}{(1+.02)^7 - 1}$$

   $$a(.02, 7) = \frac{.02(1.02)^7}{1.02^7 - 1}$$

   $$a(.02, 7) = \frac{.0229737134}{.1486856676}$$

   $$a(.02, 7) \approx .154512$$

   $$.154512 \times \$50{,}570 \approx \$7814$$

   At a 2% interest rate, the fixed costs of maintenance annualized over three years come to $243 per year.

   $$a(.02, 3) = \frac{r(1+r)^n}{(1+r)^n - 1}$$

<div align="right">(UMUC, n.d. Module 2 Unit 6)</div>

   $$a(.02, 3) = \frac{.02(1+.02)^3}{(1+.02)^3 - 1}$$

   $$a(.02, 3) = \frac{.02(1.02)^3}{1.02^3 - 1}$$

   $$a(.02, 3) = \frac{.02122416}{.061208}r$$

   $$a(.02, 7) \approx .34675$$

$.34675 \times \$700 \approx \$243$

7.   If the money spent on fixed capital costs of development and maintenance had instead been invested over the period in which the course was run, that money would have earned some interest. Annualizing these costs allows one to take into account the opportunity cost of lost interest. However, money spent on course development is often provided by a funding agency specifically for course development, and therefore is not available for investment in an interest-bearing vehicle. When this is the case, annualization is not appropriate (UMUC, n.d., Module 2 Unit 6).

8. $TC(N) = F + VN$ (UMUC, n.d., Module 2 Unit 7)

$F = total\ annualized\ fixed\ costs$
$\qquad\qquad = total\ annualized\ fixed\ costs\ of\ development$
$\qquad\qquad + total\ annualized\ fixed\ costs\ of\ maintenance$
$\qquad\qquad + total\ recurrent\ management\ costs$

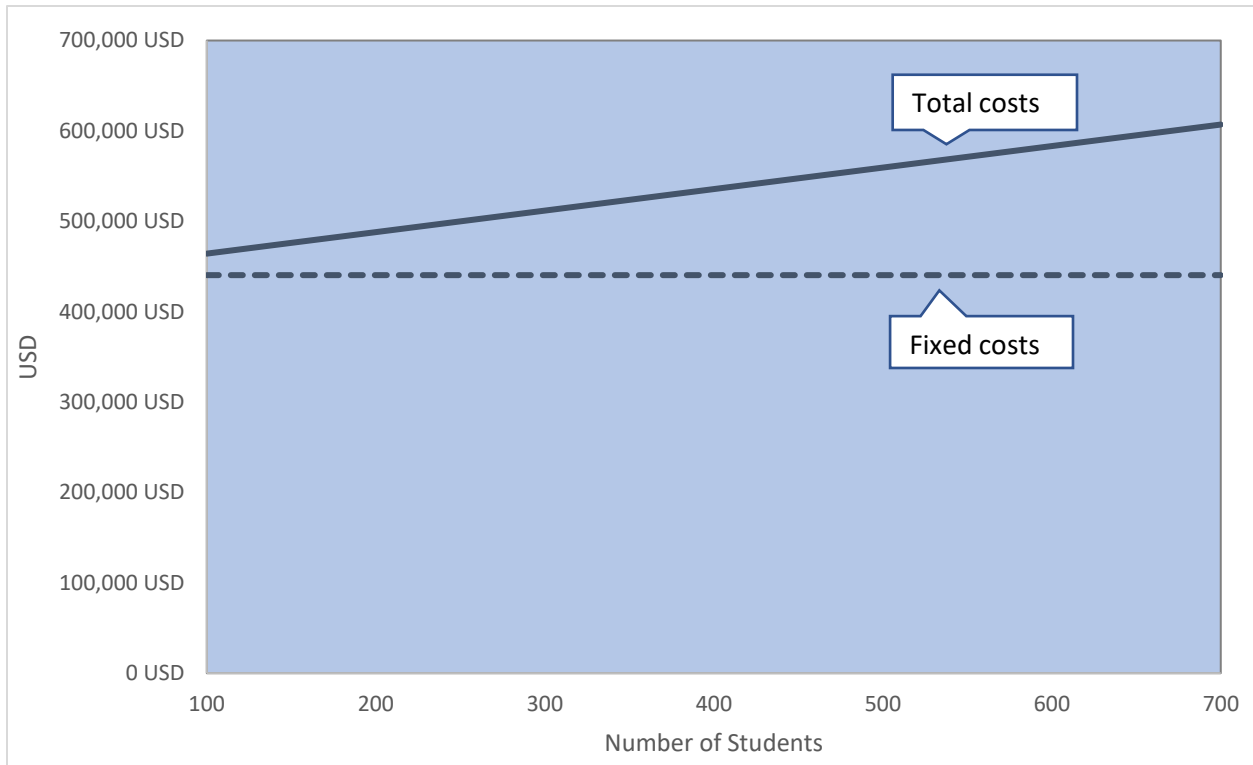$F \approx (\$7814 \times 7) + (\$243 \times 3) + (\$55{,}000 \times 7)$

$F \approx \$440{,}427$

$TC(N) \approx \$440{,}427 + \$238N$

$TC(700) \approx \$440{,}427 + \$238(700) \approx \$607{,}027$

[Slight discrepancy from spreadsheet due to rounding error]

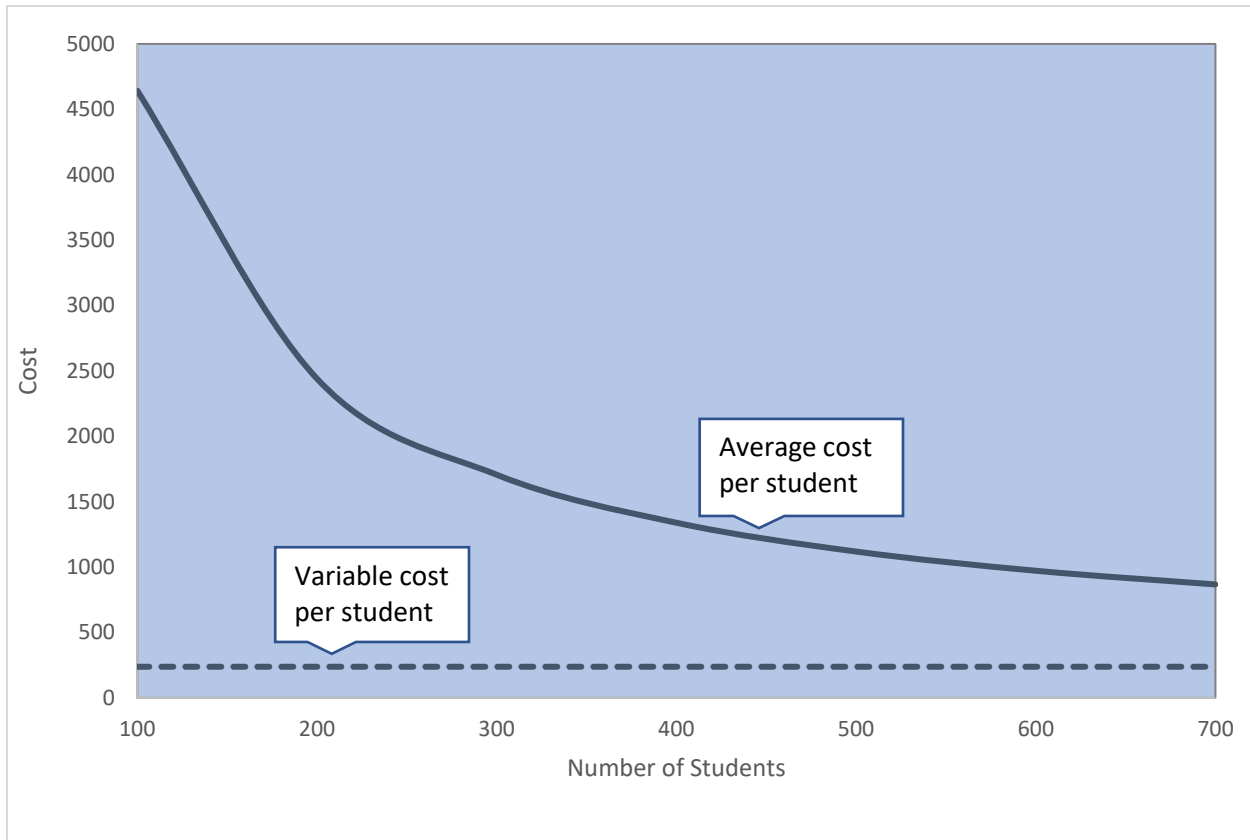9. **Figure 2: Graph of total cost function**

10. $AC(N) = \frac{F}{N} + V$

$AC(N) \approx \dfrac{\$440{,}427}{N} + \$238$

$AC(700) \approx \dfrac{\$440{,}427}{700} + \$238 \approx \$867$

11. **Figure 3: Graph of average cost function**

12. $TC = F + (V \times N)$

$I = SF \times N$

The break-even point occurs when TC = I.

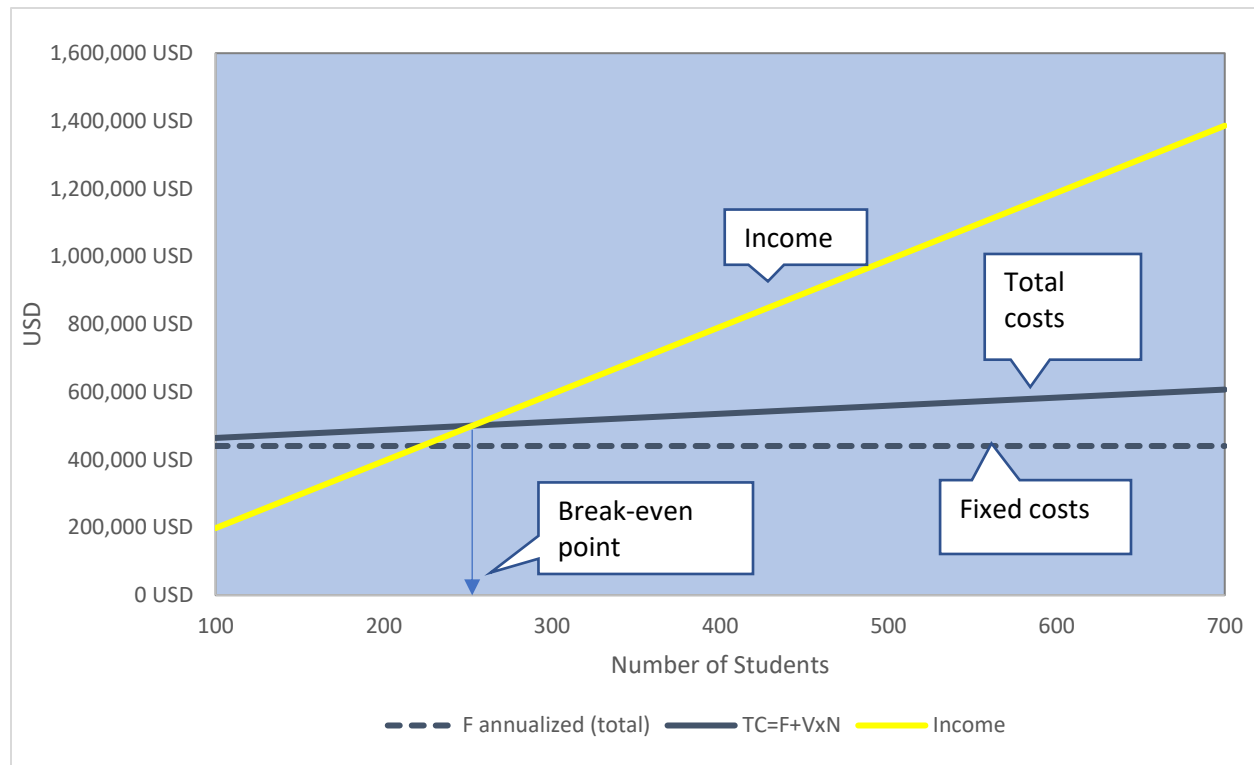$F + (V \times N) = SF \times N$

$\dfrac{F + (V \times N)}{N} = SF$

$\dfrac{F}{N} + V = SF$

$\dfrac{F}{N} = SF - V$

$N = \dfrac{F}{SF - V}$

$N \approx \dfrac{\$440{,}427}{\$1980 - \$238} \approx 253 \; students$

13. **Figure 4: Total Costs, Income, and Break-even Point**

14.   Compared to conventional modes of education provision, DE often has higher fixed costs and lower per student variable costs. Fixed costs may be higher because a great deal of development can be done up front. Variable costs may be lower because classroom facilities are not needed if students learn at home, and in some cases there may also be less teacher-learner interaction. As a result, total costs are higher for DE early in the life of a course, but increase at a lower rate than they would for conventional education. As the accumulated number of students increases, so does the relative advantage of a course with lower variable per-student cost. The larger the accumulated number of students, the closer the average cost per student gets to the variable cost per student, because fixed costs are spread over a larger number of students. The ability of DE to deliver greater cost-efficiency than conventional modes of education depends on the ability of the educational provider to keep variable per-student costs low and to enroll a large number of students (UMUC, n.d., Module 2 Unit 10).

References

University of Maryland University College (UMUC). (n.d.). Module 2: The techniques of cost analysis. In OMDE 606: Costs & Economics of Distance Education and E-Learning: Fall 2017. Retrieved from http://learn.umuc.edu