Derivation of education cost equation

The equation for the pay of teachers is:

\[(\text{teacher share}) \times (\text{revenue}) = (\text{number of teachers}) \times (\text{average pay per teacher})\]

\[s_T R = TW \quad (1)\]

The equation for student tuition is:

\[(\text{student share}) \times (\text{revenue}) = (\text{number of students}) \times (\text{tuition cost per student})\]

\[s_S R = SC \quad (2)\]

From the first equation:

\[R = \frac{TW}{s_T}\]

From the second equation:

\[R = \frac{SC}{s_S}\]

Combine these two:

\[\frac{TW}{s_T} = \frac{SC}{s_S}\]

\[\frac{TWs_S}{s_T} = C\]

\[T/S \text{ is the reciprocal of the student teacher ratio } r:\]

\[\frac{Ws_S}{rs_T} = C\]

The student/faculty ratio is the basic indicator of productivity in education. However, it is also important to look at average class size.

\[(\text{number of teachers}) \times \frac{\text{classes per teacher}}{\text{teacher}} = (\text{total classes})\]

\[T[\text{cpt}] = [\text{tc}]\]
(number of students) \* \frac{registrations \ per \ student}{student} = \text{total registrations}

\[ S[rps] = [tr] \]

The average class size is total registrations divided by total number of classes:

\[ (average\ class\ size) = \frac{tr}{tc} = \frac{S[rps]}{T[\text{cpt}]} \]

student teacher ratio =

\[ \frac{S}{T} = r = \frac{[acs] \times [\text{cpt}]}{[rps]} \]

insert into this equation:

\[ \frac{Ws_S}{rs_T} = C \]

\[ C = \frac{Ws_S[rps]}{[acs][\text{cpt}]s_T} \]