



The closing down of schools due to the Covid-19 pandemic and the consequences for science education

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(INFINITESIMAL) CALCULUS

vs FINITE CALCULUS

derivative operator D

$$Df(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$De^x = e^x$$

$$Dx^n = nx^{n-1}$$

$$D(a+bx)^n = bn(a+bx)^{n-1}$$

$$Dcf(x) = cDf(x)$$

$$D(f(x) + g(x)) = Df(x) + Dg(x)$$

product rule:

$$\begin{aligned} D(f(x)g(x)) \\ = g(x)Df(x) + f(x)Dg(x) \end{aligned}$$

quotient rule:

$$\begin{aligned} D \frac{f(x)}{g(x)} &= \frac{g(x)Df(x) - f(x)Dg(x)}{g^2(x)} \\ &\text{(if } g(x) \neq 0) \end{aligned}$$

difference operator Δ

$$\Delta f(x) = f(x+1) - f(x)$$

$$\Delta 2^x = 2^x$$

$$\Delta x^n = nx^{n-1}$$

$$\Delta(a+bx)^n = bn(a+bx)^{n-1}$$

$$\Delta cf(x) = c\Delta f(x)$$

$$\Delta(f(x) + g(x)) = \Delta f(x) + \Delta g(x)$$

$$\begin{aligned} \Delta(f(x)g(x)) \\ = g(x)\Delta f(x) + f(x+1)\Delta g(x) \end{aligned}$$

$$\begin{aligned} \Delta \frac{f(x)}{g(x)} &= \frac{g(x)\Delta f(x) - f(x)\Delta g(x)}{g(x)g(x+1)} \\ &\text{(if } g(x)g(x+1) \neq 0) \end{aligned}$$



The chairman of the student council Carl Bildt welcomes the headmaster Walter Ekman back to work at Östra Real in Stockholm 7th of November 1966 after the teachers' strike which lasted almost a month.

Photo: Freddy Lindström/TT



Common design and general outcome of home studies



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Differences in the design of home studies compared to the design at institutions



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Differences in learning outcome of home studies compared to those at school



**Differences in the design of home studies
compared to the design at schools and universities**

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These linguistically correct solutions, give poor information of understanding and learning.





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This effect is pronounced when grading is based on reproduced texts.

Without dialogue the deeper level of understanding is lost.



How to gain higher quality in the understanding of the subject content?

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To acknowledge the importance of social processes for the learning.

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Basic misconception:

To acknowledge the importance of social processes for the learning.

Teachers fail to use them methodologically when teaching at distance.



Science teaching often result in the reproduction of the words of the teacher, instead of useful skills based on the understanding of the theories taught.



How to create tasks useful to solve at home



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Results shall be shared and discussed.



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Other views, misunderstandings, etc., may promote deeper understanding.



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Consider the age of the students and the level of their studies.



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In secondary school simple experiments may be conducted at home.



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Theoretical tasks may be solved in cooperation.



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Excursions may be performed in small groups.



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Use “Escape room” pedagogy; students work together supported by teacher.

Be prepared to focus on guiding in the learning.

Support the achievement of personal abilities useful in the future.



Ceci n'est pas une pipe.

Magritte



**Thank
you for
your
attention!**