16-09-2019

Mathemateg a Rhifedd yn y Cyfnod Sylfaen
Mathematics and Numeracy in the Foundation Phase

Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Yr Athrofa
Institute of Education
Addysg i Gymru
Education for Wales

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www.athrofa.cymru

Sut wyt ti'n teimlo?
How are you feeling?

- Ar raddfa o 1 i 10, beth yw dy ymateb i'r gosodiadau sy'n dilyn?

- 1 = mwyaf negyddol
- 10 = mwyaf cadarnhaol

- On a scale of 1 to 10, what's your response to the following statements?

- 1 = most negative
- 10 = most postitive

1 2 3 4 5 6 7 8 9 10

- Pa mor egniol wyt ti heddiw?
- How energetic are you today?

1 2 3 4 5 6 7 8 9 10

- Pa mor gyfforddus yw gwres yr ystafell hon i ti?
- How comfortable are you with the warmth of this room?

1 2 3 4 5 6 7 8 9 10

- Wrth feddwl yn ôl i dy amser yn yr ysgol gynradd, sut wyt ti’n teimlo – negyddol (1) neu cadarnhaol (10)?

- Thinking back to your time at primary school, how do you feel – negative (1) or positive (10)?

1 2 3 4 5 6 7 8 9 10

- Mae'r sesiwn hon am fathemateg, sut wyt ti'n teimlo am hyn – negyddol neu cadarnhaol?
- The session today is about maths, how do you feel about it – positive or negative?

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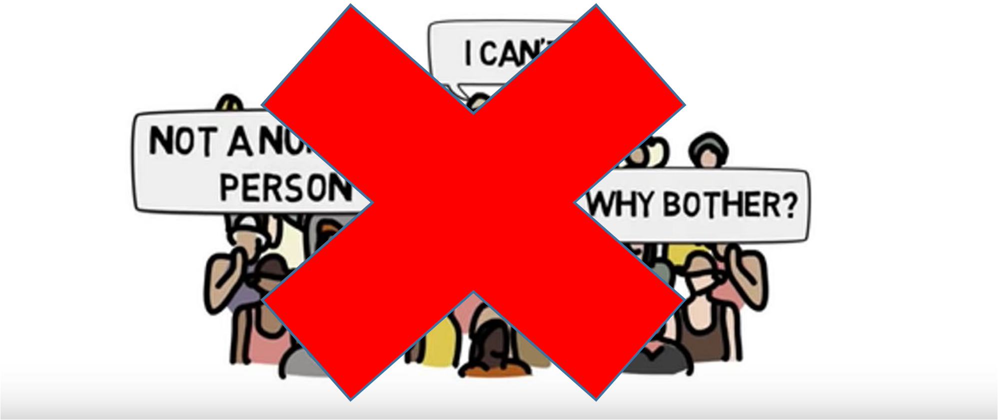
Meddwl - Paru - Rhannu
Think - Pair - Share

O fewn cyd-destun addysg, pam mae cwestiynau fel hyn yn bwysig?

In the context of education why are such questions important?

Agweddau at Fathemateg
Attitudes towards Mathematics



Mae angen i ni gyd ystyried ein hagweddau tuag at fathemateg – yn enwedig yn ein rôl fel athrawon.

We all need to consider our attitudes towards mathematics – especially within our role as teachers.

https://www.youtube.com/user/nationalnumeracy

https://www.youtube.com/watch?v=pDP-ZYAxFbs

Image from https://www.nationalnumeracy.org.uk/attitudes

Agweddau at Fathemateg
Attitudes towards Mathematics

Gwerth	Value
Cred	Belief
Ymdrech	Effort

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Amcanion y sesiwn / Session Objectives

- Ystyried mathemateg o fewn Fframwaith y Cyfnod Sylfaen (h.y. Beth ydw i'n ei addysgu?)
- Datblygu dealltwriaeth o sut mae plant ifanc yn dysgu mathemateg
- Ystyriaethau addysgeg wrth addysgu mathemateg (syniadau am sut ydw i'n addysgu mathemateg)

- Consider mathematics within the Foundation Phase Framework (i.e. What am I teaching?)
- Develop an understanding of how young children learn mathematics
- Pedagogical considerations when teaching mathematics (ideas about how do I teach mathematics)

Amcanion y modwl / Module aims

3.Aims and Learning Outcomes

AIMS

3. Amcanion a Deilliannau Dysgu

AMCANION

- **Ennyn diddordeb myfyrwyr gydag ymagwedd feirniadol at sicrhau gwybodaeth effeithiol am y pwnc a chymhwyso addysgeg o ansawdd uchel, gan gynnwys yr egwyddorion addysgegol o wneud cysylltiadau, dysgu cyfunol a chreu cyfleoedd dysgu ystyrlon a dilys.**

- **Sefydlu rôl yr athro proffesiynol o fewn arfer y myfyriwr gan gynnwys bod yn hunangyfeiriol wrth rannu a gwerthuso profiadau mewn cymuned broffesiynol ehangach.**

Beth ydw i'n ei addysgu? / What am I teaching?

G.E.D.

Yn eich grwpiau ystyriwch beth ydych yn **gwybod** ac **eisiau gwybod** am y gofynion cwricwlaidd ar gyfer mathemateg yn y Cyfnod Sylfaen

Meysydd Dysgu a rhaglenni astudio diwygiedig (2015) fideo rhagarweiniol https://www.youtube.com/watch?v=ggY1jlKUfxc

K.W.L.

In your groups consider what do you already **know** and **want to know** about the curricular requirements for mathematics in the Foundation Phase

Revised Areas of Learning and programmes of study (2015) introductory video https://www.youtube.com/watch?v=dacR55aHnw4

Dogfennau cwricwlaidd cyfredol
Current curricular documents

Datblygiad Mathemategol

Addysgeg y Cyfnod Sylfaen

Dylai plant gael cyfleoedd i ddatblygu eu sgiliau, eu gwybodaeth a'u dealltwriaeth drwy:

- gwricwlwm priodol o ran datblygiad lle mae'r saith Maes Dysgu (chwech mewn lleoliadau/ysgolion cyfrwng Cymraeg) yn cyd-fynd a chydweithio â'i gilydd
- darpariaeth barhaus a gwell, a gweithgareddau â ffocws mewn amgylcheddau dysgu a geir dan do ac yn yr awyr agored
- gwahanol fathau o weithgareddau chwarae ac ystod o weithgareddau a gaiff eu cynllunio, gan gynnwys rhai a ysgogir gan y plant
- profiadau sy'n caniatáu iddynt fabwysiadu ystod o rolau, gan gynnwys arwain mewn grŵp bach, dysgu fesul pâr neu weithio mewn tîm
- gwahanol adnoddau, gan gynnwys TGCh
- cyfleoedd dysgu ymarferol sy'n adeiladu ar brofiadau blaenorol ac sy'n eu cefnogi i dyfu'n ddysgwyr annibynnol
- gweithgareddau sy'n caniatáu iddynt ddefnyddio eu synhwyrau a bod yn greadigol a dychmygus
- tasgau a heriau sy'n eu hannog i ddatrys problemau a thrafod.

Ystod o brofiadau

Dylai plant gael cyfleoedd i:

- gael profiad o amgylchedd sy'n fathemategol gyfoethog ac sy'n caniatáu iddynt ymchwilio a datblygu cysyniadau ac iaith fathemategol
- datblygu sgiliau mathemategol ymarferol mewn pob math o gyd-destunau
- cyfathrebu mewn pob math o gyd-destunau mathemategol at ddibenion a chynulleidfaoedd amrywiol
- ymarfer, datblygu a mireinio eu sgiliau mathemategol o fewn pob agwedd ar y ddarpariaeth, gan gynnwys darpariaeth barhaus a thrwy bob Maes Dysgu
- cael profiad o amrywiol gyfryngau a chymhelliant gan gynnwys technolegau newydd
- deall a defnyddio amrywiol fesurau a gallu adnabod a defnyddio siapiau wrth chwarae ac o fewn gweithgareddau strwythuredig.

Mathematical Development

Foundation Phase pedagogy

Children should be given opportunities to develop their skills, knowledge and understanding through:

- a developmentally appropriate curriculum where the seven (six in Welsh-medium settings/schools) Areas of Learning complement each other and work together
- continuous and enhanced provision and focused activities in the indoor and outdoor learning environments
- different types of play and a range of planned activities, including those that are child-initiated
- experiences that allow them to adopt a variety of roles, including leadership within a small group, paired learning or working within a team
- different resources, including ICT
- active learning opportunities that build on prior experiences and support them to become independent thinkers and learners
- activities that allow them to use their senses, be creative and imaginative
- tasks and challenges that encourage problem solving and discussion.

Range of experiences

Children should be given opportunities to:

- experience a mathematically-rich environment that allows them to explore and develop mathematical concepts and language
- develop practical mathematical skills in a range of contexts
- communicate in a range of mathematical contexts for a variety of purposes and audiences
- practise, develop and refine their mathematical skills within all aspects of provision, including continuous provision, and through all Areas of Learning
- experience and use a range of media and stimuli including emerging technologies
- understand and use a range of measures and recognise and use shapes within play and structured activities.

Ff.Ll.Rh. – print normal

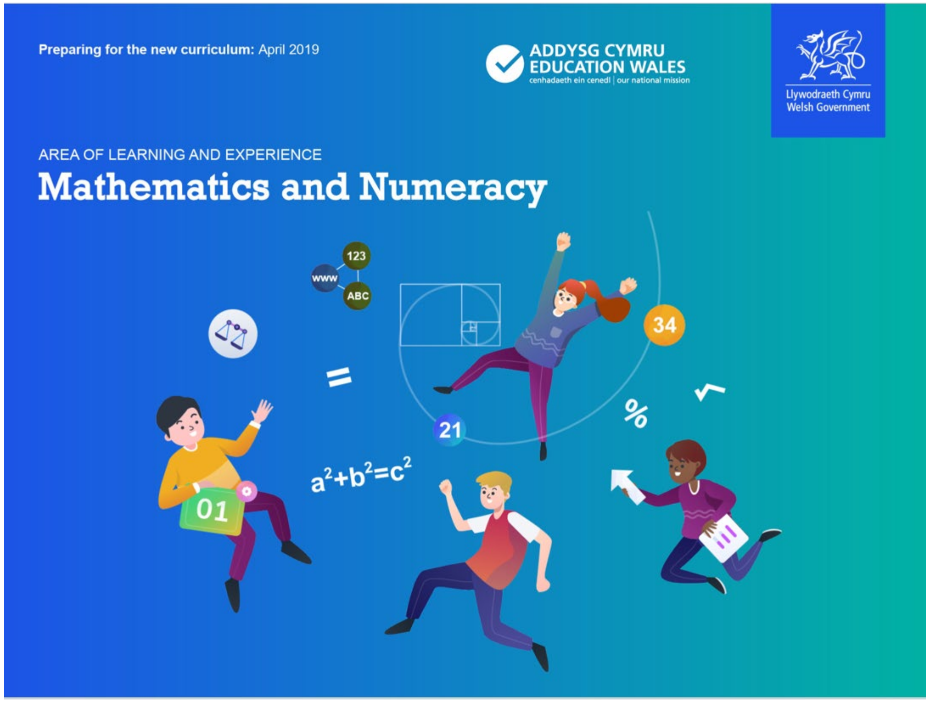
Sgil penodol Rhaglen Astudio Mathemateg – print trwm

L.N.F. – non-bold print

Specific Mathematics Programme of Study skills - bold print

Datblygiadau Diweddaraf

Latest Developments



https://llyw.cymru/paratoi-ar-gyfer-y-cwricwlwm-newydd?_ga=2.148892471.1446130577.1566392046-233607502.1543914796

https://beta.gov.wales/preparing-new-curriculum-update-feb-2019

Sut mae plant ifanc yn dysgu mathemateg? / How young children learn mathematics?

Egwyddorion y Cyfnod Sylfaen

- Natur gyfannol dysgu
- Adeiladu ar ddysgu blaenorol
- Diddordebau plant
- Dysgu trwy brofiad
- Dysgu trwy chwarae
- Defnyddio amgylcheddau dysgu gwahanol

Foundation Phase Principles

- The holistic nature of learning
- Building on prior learning
- Children's interests
- Learning through experience
- Learning through play
- Using different learning environments

Cymharu a Chyferbynnu / Compare and Contrast…

Egwyddorion y Cyfnod Sylfaen a'r 12 Egwyddor Addysgegol (Donaldson, 2015)

The Foundation Phase Principles and the 12 Pedagogical Principles (Donaldson, 2015)

Esiamplau ymarferol o ddysgu mathemateg
Practical examples of mathematics learning

Dwy astudiaeth achos

- Gweithiwch mewn parau
- Byddwch yn darllen un o ddwy astudiaeth achos
- Trafodwch rôl dysgu trwy chwarae a dysgu trwy brofiad
- Unrhyw ystyriaethau eraill/ cysylltiadau cwrciwlaidd?

Two case studies

- Work in pairs
- Each will read one of two case studies
- Discuss the role of play and learning through experience within mathematics learning
- Any other considerations/ possible curriculum links?

Taken from pp.6-9

Taylor, H. (2014) 'How Children Learn Mathematics and the Implications for Teaching', in Taylor H. and Harris, A. (ed.) *Learning and Teaching Mathematics 0-8*, London: Sage.

Sut mae plant ifanc yn dysgu mathemateg? / How young children learn mathematics?

"The quality of adult interaction is crucial"

Gifford, S. (2008) '"How do you teach nursery children mathematics?" In search of a mathematics pedagogy for the early years', in Thompson, I. (ed.) *Teaching and Learning Early Number*. 2nd ed. Maidenhead: Open University Press. p.223

Rôl yr oedolyn

- Cefnogi plant yn emosiynol – bod yn gadarnhaol a chanmol ymdrech
- Scaffoldio dysgu'r plant a'u dewis o weithgareddau gydag adnoddau a chyfleoedd dysgu pwrpasol
- Hyrwyddo dealltwriaeth fathemategol drwy siarad
- 'meddwl ar y cyd hir ei barhad' (*sustained shared thinking*)

The adult's role

- Supporting children emotionally – positivity and praise for effort
- Scaffolding children's learning and their choice of activities with appropriate resources and learning opportunities
- Promoting mathematical understanding through talk
- 'sustained shared thinking'

Sut mae plant ifanc yn dysgu mathemateg? / How young children learn mathematics?

Dychmygwch bod gennym system rhif newydd. Mae 'a' yn cyfateb i 1, 'b' yn cyfateb i 2 a.y.y.b.

- Cyfrifwch ymlaen am y 10 'rhif' cyntaf
- Cyfrifwch yn ôl o 'y'
- Cyfrifwch ymlaen mewn camau o 'b'

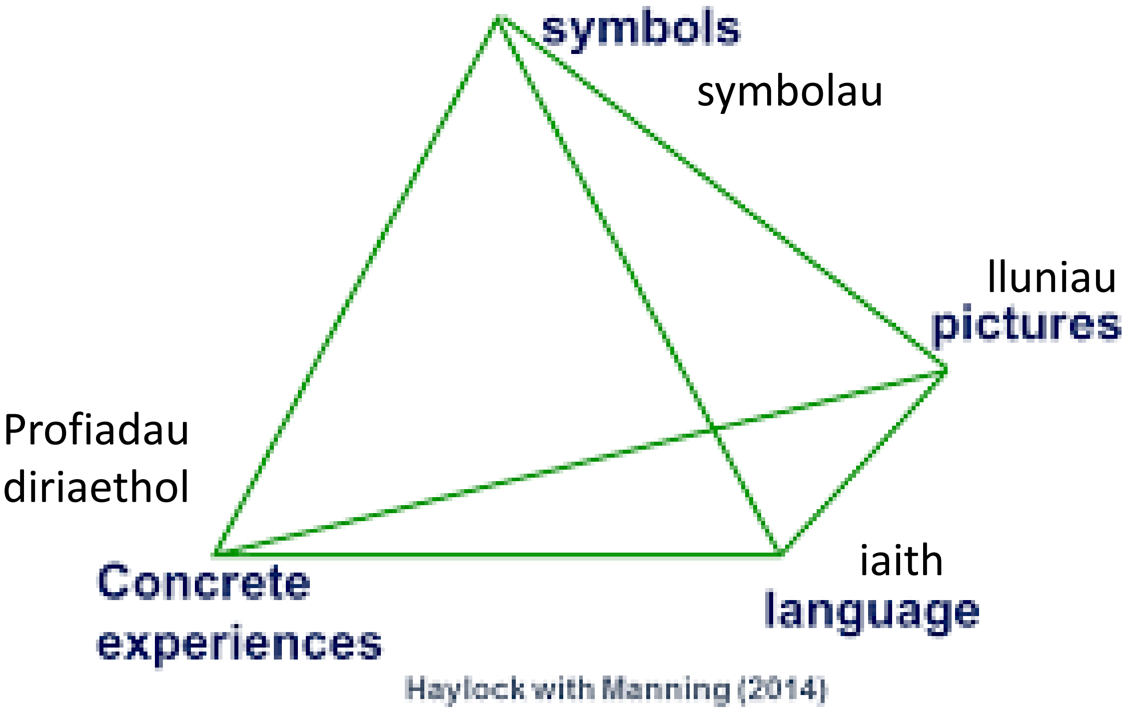
Beth mae hyn yn ei ddangos i ni am y broses o ddysgu cyfrif a defnyddio rhif?
Pa adnoddau / symudiadau allau helpu plant ifanc i ddysgu rhifo?

Imagine we have a new number system
'a' is equal to 1, 'b' equals 2 e.t.c.

- Count forwards for the first 10 'numbers'
- Count backwards from 'z'
- Count forwards in steps of 'b'

What does this show us about the process of learning to count and using number?
What resources / movements could help young children learn to count?

Y Model Cysylltiadau - The Connections Model



Making Connections

DEFINITION

Making connections in mathematics refers to the process in learning whereby the pupil constructs understanding of mathematical ideas through a growing awareness of relationships between concrete experiences, language, pictures and mathematical symbols. Understanding and mastery of mathematical material develops through the learner's organization of these relationships into networks of connections.

EXPLANATION AND DISCUSSION

Haylock and Cockburn (2003: 3–8) offer the model illustrated in Figure 18 as a simple way of discussing how children's understanding can be developed, particularly in relation to their understanding of number and arithmetic operations.

The model is based on the idea that the development of understanding involves making cognitive connections between some new material or some new experience and our existing ideas. If we cannot make con-

Haylock with Thangata (2007) , *Key Concepts in Teaching Primary Mathematics,* SAGE available at:

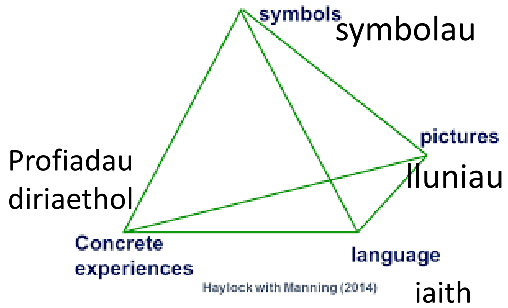
http://studysites.uk.sagepub.com/haylock/Making%20Connections.pdf

- Gwyliwch / Watch:

https://www.ncetm.org.uk/resources/40533

https://www.youtube.com/watch?v=YPWmOVt8vgw

https://www.youtube.com/watch?v=VGkjjVfnGYI



Gwylio ac Adfyfyrio – Watch and Reflect

- Sut mae'r athrawes yn adeiladau ar wybodaeth flaenorol a gwneud cysylltiadau?
- Pa agweddau o'r model cysylltiol sydd i'w gweld yn y clip addysgu?
- Gwnewch nodyn o'r esiamplau sy'n cysylltu gyda'r Model Cysylltiadau

- How does the teacher build on prior knowledge and make connections?
- What aspects of the Connections Model can be seen in the teaching clip?
- Make a note of the different examples that link with the Connections Model

Tasg - Task

Meini Prawf Llwyddiant

- Cynlluniwch weithgaredd RHIF wedi ei selio ar grŵp oedran penodol
- Defnyddiwch adnodd penodol a sgil benodol (Fframwaith CS, 2015)
- Ystyriwch sut mae cynnwys pedair elfen y Model Cysylltiadau

Success Criteria

- Plan a NUMBER learning activity based on a specific age group
- Link to a specific resource and number skill (FP Framework, 2015)
- Consider how could you incorporate the four elements of the Connections Model

Datblygiad proffesiynol/ Professional development

G.E.D.

Yn eich grwpiau ystyriwch beth ydych wedi ei **ddysgu** heddiw. Beth yw'r camau nesaf sydd angen i chi eu cymryd er mwyn datblygu eich dealltwriaeth?

Cefnogaeth bosib?

K.W.L.

In your groups consider what have you **learnt** today. What are the next steps you need to take to develop your understanding?

Possible support?

Cyfeirnodau / References

Donaldson, G. (2015) *Dyfodol Llwyddiannus: Adolygiad Annibynnol o'r Cwricwlwm a Threfiadau Asesu yng Nghymru.* Caerdydd: Llywodraeth Cymru

Donaldson, G. (2015) *Successful Futures: Independent Review of Curriculum and Assessment Arrangements in Wales.* Cardiff: Welsh Government

Gifford, S. (2008) '"How do you teach nursery children mathematics?" In search of a mathematics pedagogy for the early years', in Thompson, I. (ed.) *Teaching and Learning Early Number*. 2nd ed. Maidenhead: Open University Press.

Haylock, D. & Cockburn, A. (2014) *Understanding Mathematics for Young Children*. 4th ed. London: SAGE.

Haylock, D. & Thangata, F. (2007) *Key Concepts in Teaching Primary Mathematics,* SAGE available at: http://studysites.uk.sagepub.com/haylock/Making%20Connections.pdf

Taylor, H. (2014) 'How Children Learn Mathematics and the Implications for Teaching', in Taylor H. and Harris, A. (ed.) *Learning and Teaching Mathematics 0-8.* London: SAGE.

Dysgu Cyfeiriedig – Directed Study

Darllenwch:

- tt.8-18

Haylock, D. & Cockburn, A. (2014) *Understanding Mathematics for Young Children*. 4ydd arg. Llundain: SAGE.

- yr erthygl fer'Making Connections' https://studysites.uk.sagepub.com/haylock/Making%20Connections.pdf

Read

- pp.8-18

Haylock, D. & Cockburn, A. (2014) *Understanding Mathematics for Young Children*. 4th ed. London: SAGE.

- the short article 'Making Connections' https://studysites.uk.sagepub.com/haylock/Making%20Connections.pdf