

Book Reviews

Count Us In: How to Make Maths Real for All of Us
Professor Gareth Ffowc Roberts, 13 January 2016
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+144 pp.
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This is an enchanting book that will appeal to anyone interested in mathematics, Welsh culture or education. It is written in a very accessible style, in the form of a series of short stories based on personal experience and includes some interesting mathematical puzzles. However, it is far more than a series of interesting tales from the life of a well-known Welsh mathematics educator. There are key themes threaded through the book that are of interest to anyone interested in the place of mathematics in Welsh culture or the place of Welsh culture in mathematics.

The author takes pleasure in mathematics and the teaching of mathematics. This is clear from the start, when he confesses to having collected car registration numbers as a child. He gained pleasure from working with numbers, but also describes the panic that set in when he failed to understand long division in school. The problem was that his teacher's instructions did not make sense. She was content if the pupils could follow the procedure. Making sense, developing understanding was not required. The author makes it clear that from the start, he found it necessary to not just *know how*, but also to *understand why*. Opinions divide strongly on this issue, with some government ministers claiming that only the procedure is important. It is clear that the author thinks differently and this theme re-appears in the succeeding chapters.

Another theme that runs through the book is the interaction between culture and mathematics. A strong claim is made about the place of mathematics in Welsh culture and that it should stand alongside music and poetry. Although mathematics appears to have some universal characteristics, they are refracted and interpreted through a cultural prism. The author describes a conference in Quebec (that I also attended) at

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which ethno-mathematics was a strand. Cultural mathematical experiences from around the world were shared including between Inuit and Mauri mathematics educators. The beauty of mathematics was found in different forms in different contexts, but could be shared profitably. Mathematics should be acknowledged as contributing to the culture in which it is embedded as well as growing from it, through daily activity. The importance of the language of instruction is considered and the impact of teaching mathematics through the language of the conqueror is discussed.

The chapter about Robert Recorde is fascinating and a good introduction to the work of a man the author describes as a hero of mathematics education. In Wales he is famous for his development of the '=' equals sign notation. However, more importantly he was the first Briton to address seriously the challenges involved in teaching and learning mathematics. He aimed to bring mathematics to ordinary people and was the first to write texts about arithmetic and algebra in English. He also interpreted classical Euclidean geometry for ordinary people. Interestingly, he wrote his books in a dialogic style to parallel the way he thought teaching ought to be conducted. He demanded that students should understand why as well as know how, stating 'otherwise you will be reduced to having to repeat methods mechanically rather than using your ability to reason'.

There is something for everyone in this book. The chapter on Welsh counting systems is intriguing, with its comparison of old and new Welsh counting systems and the debates about their use. I am an English speaker but I was aware of the vigesimal system and its base twenty characteristics from discussions with Welsh-speaking students. However, I was drawn into the discussion in this chapter and recommend it to anyone who has not considered the impact of language on mathematics.

The work of William Jones relating to Archimedes number and his use of the Greek letter π (pi) is discussed, along with the work of other significant Welsh mathematicians. Examples of mathematics from throughout the world are considered in the book, including the Mayans and Patagonians. The theme of interaction between culture and mathematics continues, as does the demand for understanding why and not just knowing how.

There is a clear focus throughout on the pleasure that our species finds in spotting patterns and playing with numbers. More than this, however, is a belief that shines through that all of us can develop a real understanding of mathematics and experience the pleasure that success in problem solving brings, if given the right circumstances for learning.

The final chapter of the book returns to the theme of 'How to make maths real for all of us'. The image of mathematics as a mystical art to be conjured by 'Mathemagicians' rather than ordinary people has a long tradition. In contrast, Robert Recorde aimed to make mathematics available to 'the unlearned sort'. This should not be through a restricted diet of rote learning of arithmetic for the working-class masses with the delights of more advanced mathematics restricted to the few. It is possible that the use of new methods of communication such as social media may help us to democratise mathematics and help everyone to access the mathematical aspects of our culture.

This book is aimed at a wide readership. It is easily accessible, even to those who have been led to consider themselves as being not mathematical. It advocates making maths real for all of us and goes a long way towards doing that.

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A class apart: learning the lessons of education in post-devolution Wales

Gareth Evans,

Welsh Academic Press

+ 223 pp.

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This is an interesting account of education in Wales following devolution. It does not make happy reading. There have been numerous policy initiatives that have not yet realised Wales's ambition to be a successful education system. The author is a journalist and this is apparent throughout the book, where he is not always rigorous in his use of evidence to support assertions. For example, he alludes to Wales's high academic achievement in the past with little concrete evidence. He does draw on Joint Council for Qualifications (JCQ) A level data (table 5, p. 177) to show that, between 2002 and 2013, England improved its percentage pass rates by about 4 per cent compared with Wales and Northern Ireland. Wales had performed slightly better than England in 2002 but improved at a slower rate, so was performing less well than England in 2013. Table 1 below showing GCSEs across the same time period (JCQ, all full GCSEs data) reveals a similar but more marked trend, although the lack of higher grades achieved by GCSE candidates in Wales in 2013 is particularly stark.

Table 1. Comparing all full GCSE cumulative percentages at grades A, C and G, 2002 with 2013

	2002			2013		
	A	C	G	A	C	G
UK	16.4	57.9	97.9	21.3	68.1	98.8
England	16.2	57.4	97.9	22.3	67.9	98.8
Northern Ireland	21.0	68.4	97.7	27.9	76.5	99.2
Wales	20.4	59.7	97.9	19.2	65.7	98.7

Evans talks about a complacent system where the removal of national curriculum tests (SATs) and the school inspectorate (Estyn) contributed to a gradual reduction in educational standards. Wales has a population of 3 million people and twenty-two local authorities, compared to England with over 60 million people and about 120 local authorities. Schools are largely administered by the local authorities and with a tightening of the inspection regime in 2010 most have been found wanting. Despite ministerial plans to move to larger regional bodies for the administration of schools, this plethora of ineffective local authorities remains.

Since devolution there have been two long-serving education ministers: Jane Davidson (20007) and Leighton Andrews (200913). Evans describes their legacy and the fact that the Welsh Assembly Government Department for Education and Skills does not have a strong track record on policy implementation. The book includes individual interviews with Davidson and Andrews.

Jane Davidson, a former teacher, proved to be a popular minister. She removed national curriculum testing, introduced the foundation stage and the Welsh Baccalaureate, and subscribed Wales to PISA in 2006. Teacher assessment was meant to replace national curriculum testing; however some claim that this did not work and was symptomatic of the inadequacies within the education department. The first Programme for International Student Assessment (PISA) results in 2007 looked grim for Wales but subsequent results were worse, despite assembly plans to integrate PISA style assessments into schools from 2011. In summer 2013, the Literacy and Numeracy Framework was launched and national testing was reintroduced, but it remains to be seen whether or how these initiatives will impact on the PISA 2015 results.

With the plethora of activity concerning education policy, implementation received relatively scant attention and there is no evidence that investment in upskilling teachers was a priority. The Welsh Labour Party led the Welsh Assembly Government and Michael Gove suggested that Labour education policies could be seen in action in Wales (p. 184). This seems to be a convenient untruth. The work of the National Strategies in England under New Labour led to genuine improvements in attainment, particularly in primary schools, as measured by the Trends in International Mathematics and Science Study (TIMSS, see Ruthven, 2011). Indeed, under New Labour a considerable expert workforce existed to support school and teacher development. The National Strategies were disbanded in 2011 and the radical changes in education policy instigated by the coalition government in England led by Michael Gove covering all aspects of curriculum, assessment and qualifications are expected to be implemented in the same way that significant changes were implemented in Wales. That is, with no systematic expert support for teachers.

Evans points out that education in Wales is less well funded than in England and the teaching profession has a relatively low morale (p. 185). This may be because they feel that they are the scapegoats for Wales's low PISA performance. Recruitment of head teachers is very difficult in Wales (p. 213), there is no equivalent to the National College for School Leadership in England that provided high-quality support for school leaders and raised their status.

In England, the Department for Education is only responsible for education to age sixteen, and post-16 and higher education are the responsibility of the Department for Business Innovation and Skills (BIS). In Wales, however, the Department for Education and Skills is responsible for all phases of education. As well as fire-fighting PISA and introducing new school qualifications the minister was desperately trying to rationalise Wales's higher education establishment – from thirteen institutions to six. In practice, there are now eight although the long-term future is still insecure (p. 128). The rationalisation did not go smoothly and the now Cardiff Metropolitan University caused particular challenges.

Only Wales's FE sector is seen as being co-operative and forward looking. Although it complains about the amount of remedial work needed to get school leavers' basic skills to a suitable standard. After its difficult start, the Literacy and Numeracy Framework is still seen as a potential saviour in this regard.

Leighton Andrews was an ambitious minister responsible for initiating twenty-four reviews whilst in office. He was not afraid to tackle issues

head on and was particularly robust when changes to grading in English in 2012 resulted in WJEC results being particularly disappointing. To Michael Gove's chagrin, Andrews ordered remarking and several candidates received revised grades. Evans speculates on whether or not Andrews actually knew about the Ofqual change that resulted in this grading fiasco, as civil servants certainly did. Prior to the coalition government in England, the three-country agreement had ensured that GCSEs and A levels were the same across England, Northern Ireland and Wales.

Michael Gove had no respect for this agreement and instigated wide-ranging reform to English qualification, despite the evidence for these changes being less than convincing. For example, the Ofqual (2012) report on A levels found that UK qualifications did compare well with the rest of the world. In England, GCSEs and A levels are becoming linear only. Wales has decided to develop its own qualifications in mathematics, English and Welsh. For mathematics, Northern Ireland has always offered an additional mathematics GCSE aimed at higher attaining pupils, as well as GCSE mathematics. Since September 2015, WJEC has offered two GCSEs in mathematics to maintained schools in Wales: GCSE mathematics and GCSE mathematics – numeracy; most students are expected to do both. There are three tiers of entry, unlike in England where there are just two tiers. The regulation of these new qualifications is the responsibility of the Welsh Assembly Government. Given the Department for Education and Skills's shortage of competent expertise, there are concerns about how well the new qualifications will work and how standards will be maintained.

At the end of the book, Evans describes the latest Welsh Assembly Government education initiative Challenge Cymru, drawing on the experience of Challenge London and Challenge Manchester. This is alongside Central South Wales Challenge, and The Lead and Emerging Practitioner Schools programme. As always, it seems there are too many initiatives in such a small country that are not joined up. OECD was invited to comment on Wales's education system and found initiative fatigue amongst teachers and a lack of long-term vision (p. 193). It is clear that there is considerable potential in Wales but without a step change in the pace and proliferation of educational reforms it is unlikely that its aspirations for the future will be met.

Overall, this is a very readable account of the evolution of education policy in Wales post-devolution. Changes have covered all phases of education including higher education. Despite the lack of evidence in some places it makes a valuable contribution to understanding Welsh

education. I am thankful that the Secretary of State for Education in England does not have such far-reaching powers.

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Bywyd Normal

Tudor Ellis, 1 January 2011

Gwasg y Bwthyn

+ 200 tt.

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Mae'r llyfr *Bywyd Normal* yn sicr o apelio at y rhai hynny sydd â diddordeb mewn hyfforddiant athrawon ac addysg yng Nghymru. Bwriad y llyfr yw cyflwyno braslun o brofiadau'r miloedd o fyfyrwyr Coleg Normal Bangor o'i sefydlu yn 1858 hyd at ei integreiddio gyda Phrifysgol Bangor yn 1996.

Yn ogystal â manteisio'n helaeth ar ei brofiadau personol o bron i chwarter canrif fel darlithydd yn Adran Addysg y Coleg Normal, fel ffynhonnell ar gyfer cynnwys y llyfr, defnyddiodd yr awdur amrediad o ffynonellau ysgrifenedig amrywiol. Roedd y ffynonellau hyn yn cynnwys cofiannau a hunangofiannau, gyda nifer ohonynt wedi'u cyhoeddi ac eraill yn llawysgrifau. Defnyddiwyd hefyd ddeunydd gwerthfawr a dderbyniwyd gan nifer o gyn-fyfyrwyr a'u teuluoedd mewn ymateb i apêl am atgofion. Cyfeirir hefyd at gynnwys cylchgrawn swyddogol y coleg, sef *Y Normalydd*/

The Normalite (1896–1968). Bu'r awdur yn cyfweid rhai o'r cyn-fyfyrwyr, gyda rhai o'r atgofion yn dyddio'n ôl cyn belled a'r 1920au.

Esbonia'r awdur nad oedd yn fwriad ganddo ysgrifennu hanes systematig o'r sefydliad ond yn hytrach ceisio cyfleu agweddau pwysig o fywyd y coleg drwy lygaid a phrofiad bywyd myfyrwyr. Mae'n sicr yn llwyddo i wneud hynny ac fe'n cyflwynir i ystod o gymeriadau diddorol a lliwgar yn ystod y llyfr, yn cynnwys rhai a ddaeth yn enwog iawn yn ddiweddarach, megis yr ysgolhaig Syr Henry Jones, a fu'n astudio yno yn ystod yr 1870au; y diddanwr Ryan Davies, y prifardd Gerallt Lloyd Owen; y colofnydd a'r awdures Hafina Clwyd a'r canwr pop Bryn Fôn.

Dewisodd yr awdur fabwysiadu'r arddull gronolegol wrth ysgrifennu am hanes Coleg y Normal. Teg yw nodi mai un o'r problemau mwyaf a wynebai ysgrifenydd hanes colegau yw'r penderfyniad parthed y dewis o arddull i'w fabwysiadu, hynny yw, ai'r agwedd gronolegol neu'r agwedd thematig. Penderfynodd yr awdur neilltuo pennod yr un i'r blynyddoedd cynnar (1858–1901), y blynyddoedd canol (1910–57) a'r blynyddoedd mwy diweddar (1957–96). Ym mhob un o'r penodau hyn ceir dyfyniadau o gylchgrawn coleg y myfyrwyr, gyda'r cyfeiriadau hynny yn bennaf yn canolbwyntio ar ddigwyddiadau chwaraeon a gweithgareddau diwylliannol. Rhoddir sylw teilwng i ddigwyddiadau anghyffredin megis streic y myfyrwyr yn 1890 am safon y cig ac ymweliadau gan y Beatles yn haf 1967 i gyfarfod eu guru ysbrydol Maharishi Mahesh Yogi, a arweiniai benwythnos confensiwn myfyrdod trosgynnol yn y coleg. Ar adegau, mae'n anodd i'r darlennydd ddilyn datblygiad rhai agweddau penodol o fewn hanes ac addysg y coleg. Efallai bod hyn yn cael ei gydnabod gan yr awdur, sydd yn y bennod olaf yn symud i ffwrdd o'r arddull gronolegol a chyfeirio fwyfwy at agweddau a themâu penodol o fywyd Normal megis y cyrsiau academiaidd a'r bywyd crefyddol, cymdeithasol a diwylliannol.

Diddorol oedd darllen am darddiad yr enw 'Normal' a'i gysylltiad pell â hanes creu sefydliadau ar gyfer hyfforddi athrawon ar gyfandir Ewrop. Un o ystyron y gair normal yn yr Almaeneg yw 'safonol' ac felly ystyr ysgolion neu colegau normal ydoedd ysgolion neu golegau sy'n gosod y safon (y 'norm') ar gyfer addysg ac ar gyfer yr hyn y dylai darpar-athrawon ymgynraedd ato. Yng nghyd-destun y pwyslais diweddar ym myd addysg ar ddinasyddiaeth, gellir dadlau hefyd bod y coleg ar flaen y gâd, gyda'i arwyddair, *Goreu diwylliwr athraw da*. Neges yr arwyddair yw mai pennaf nod athro yw trosglwyddo gwerthoedd ein diwylliant i bob cenhedlaeth newydd o blant, ac mai ei gwir amcan yw datblygu dinasyddion eang eu gornwylion wedi'u trwytho yng ngwerthoedd sylfaenol cymdeithas wâr.

Yn y bennod ar y 'Y Cyfnod Cynnar' (1858 tan 1910), cyfeiria'r awdur at y Normal fel coleg bach a oedd yn hyfforddi dynion yn unig, gyda'r mwyafrif ohonynt wedi dod i'r coleg drwy gynllun y disgybl-athro. Gwelir yma ddisgrifiadau craff o gynnwys y cwrs academiaidd a'r amserlen hirfaith. Efallai oherwydd cynnydd yn atgofion cymdeithasol a diwylliannol y cyn-fyfyrrwyr yn y cyfnodau diweddarach, tueddir i ganolbwyntio llai ar argraffiadau myfyrrwyr o'u profiadau academiaidd ac o ganlyniad mae'n anodd i'r darlennydd olrhain datblygiad a newidiadau arwyddocaol o fewn y cwrs addysg. Er mai prif fwriad y llyfr oedd ymwneud â phrofiadau ansoddol y myfyrrwyr, byddai cynnwys ambell i dabl o ystadegau am niferoedd y myfyrrwyr, canran gwrywaidd a benywaidd, nifer y siaradwyr Cymraeg a di-Gymraeg, ac o ble y daethant wedi cyfoethogi'r trafodaethau a'r cynnwys.

Ceir cydbwysedd da rhwng y dewis o leisiau gwrywaidd a benywaidd ac hefyd siaradwyr Cymraeg a di-Gymraeg. Ni dderbyniwyd myfyrrwyr benywaidd i'r coleg tan 1910. Dysgw'n bod myfyrrwyr benywaidd yn gorfod dilyn rheolau llawer mwy caeth na dynion. Roedd disgwyl iddynt fynd i'w gwely yn gynt, bwyta bwyd gwahanol a rhoddwyd llawer mwy o gyfyngiadau ar ble y gallent grwydro o'r neuaddau preswyl. Pan benderfynodd Sheila Davies, myfyriwr o Rhondda, siarad ar ran y myfyrrwyr benywaidd am yr amgylchiadau anffafriol hyn, fe'u diarddelwyd yn unionsyth gan awdurdodau'r coleg! Crybwyllwyd ei hachos yn Nh_r Cyffredin, ar er iddi gael ei hadfer, fe'i trosglwyddwyd i Gaerdydd.

Cyfeiria'r awdur at nifer o droeon trwstan y cyn-fyfyrrwyr megis cael eu cloi allan o'r neuaddau preswyl, hoelio esgidiau'r darlithiwr i'r llawr fel ei fod yn hwyr yn cyrraedd y ddarlith a derbyn canlyniadau pêl droed drwy hongian llinyn allan o ystafell y neuadd. Fodd bynnag, tueddai'r troeon trwstan hyn i ganolbwyntio ar brofiadau diwylliannol a chymdeithasol y myfyrrwyr yn hytrach na phrofiadau academiaidd. Byddai'r darlennydd yn sicr wedi elwa o ddarllen mwy am brofiadau myfyrrwyr yn yr ystafelloedd darlithio ac ar brofiadau dysgu.

Nid oedd y myfyrrwyr yn gweld lygaid yn lygaid â phopeth o fewn y coleg ychwaith. Yn y llyfr, mae'r awdur yn cyfeirio at y tensiwn a fodolai weithiau rhwng y myfyrrwyr ar brofiad dysgu yn yr ysgol a thiwtoriadau y coleg. Clywir hefyd bod ambell i fyfyriwr yn anfodlon â chynnwys rhai o'r darlithoedd yn y coleg. Roedd rhai o'r myfyrrwyr gwrywaidd yn anfodlon nad oedd y merched yn gorfod mynd i ysgolion arbennig yn nociau Lerpwl yn yr 1930au. Fodd bynnag, wedi dweud hyn, canmol yn fawr y gefnogaeth

a'r ysbrydoliaeth a dderbyniasant gan y darlithwyr a wnaeth y mwyafrif helaeth o'r cyn-fyfrwyr yn y llyfr.

Yn sicr, effeithiodd y ddau ryfel byd ar gyfansoddiad y sefydliad, a dysgwn bod nifer y myfyrwyr gwrywaidd wedi gostwng yn ystod y cyfnod a nifer y myfyrwyr benywaidd wedi cynyddu. Diddorol oedd darllen am effaith y dogni bwyd ar y myfyrwyr, y llythyrau a anfonwyd i'r coleg gan y myfyrwyr hynny ar faes y gâd ac hefyd ymateb y myfyrwyr hynny a fu'n gwneud *National Service* cyn dod i'r coleg. Byddai'r darllenwr wedi elwa hefyd o glywed beth ddigwyddodd i'r rhai hynny a oedd yn wrthwynebwyr cydwybodol yn ystod y rhyfel.

Ni ellir gwadu bod yr iaith Gymraeg yn thema ganolog o fewn y llyfr. Rydym yn cael ein cyflwyno drwy atgofion y cyn-fyfrwyr i'r diffyg parch a statws a roddwyd i'r Gymraeg yn ystod blynyddoedd cynnar y coleg. Cyfeirir hefyd at amharodrwydd darlithwyr ac ysgolheigion a siaradai Gymraeg i gyfarch myfyrwyr yn eu haith gyntaf hyd yr 1960au. Dysgwn hefyd yn y llyfr am gyfraniad y Coleg Normal i ddarparu adnoddau addysgol drwy gyfrwng y Gymraeg gyda chyfeiriadau at sefydlu Canolfan Bedwyr a chreu adnoddau *Cynllun y Porth* ar gyfer dysgwyr Cymraeg iaith gyntaf.

Yn sicr, mae'r ffotograffau sydd wedi eu cynnwys wedi cyfoethogi'r llyfr megis cofeb ymweliad y Beatles â'r coleg yn 1967. Fodd bynnag, byddai cynnwys mwy o ffotograffau o adeiladau eiconig o'r coleg wedi bod yn fanteisiol megis y 'Syrca's', ystafell ddarlithio ar gynllun crwn a ymdebygai yn ôl pob sôn i dalwrn ceiliogod. Byddai mapiau hanesyddol o safleoedd y campws a llinell amser wedi helpu y darllenwydd o'r newidiadau sylfaenol yn hanes y coleg.

Er gwaethaf ambell i sylwad, mae'r awdur wedi rhoi at ei gilydd yn y llyfr *Bywyd Normal* gasgliad diddorol tu hwnt a fydd yn sicr o apelio, nid yn unig at y rhai sydd â chysylltiad agos â Choleg Normal, ond hefyd at y rhai hynny sydd â diddordeb mewn hanes ehangach addysg yng Nghymru.

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