Original Paper

Secondary Curriculum in the Time of Digitisation

Mike Douse[1*] & Philip Uys[2]

[1] International Educational Development Advisor, Ireland

[2] Division of Learning and Teaching, Charles Sturt University, Orange, Australia

[*] Mike Douse, International Educational Development Advisor, Ireland

Abstract

This paper explores the consequences for the secondary curriculum of education's forthcoming and fundamental transformation into the Digital Age. Piecemeal ICT "add-ons", once seen as innovative and ingenious, have become dysfunctional distractions, no matter how powerful the research and marketing behind them. The requirement from now onwards is for a creative, comprehensive (and conceivably cosmopolitan) learner-driven secondary curriculum, determined, owned and enjoyed by the students and conveyed by their teachers. As the Global School—the universal lifelong educational experience—eventuates, the substance, practice and consequences of education can and should become much more equitable, ethical and enjoyable (and far less competitive, test-oriented and world-of-work-dominated). The justifications for specific post-primary "Computer Studies" programmes evaporate once all subjects are digitally-embracing. These and other implications of this ground-breaking "Education based upon Digitisation" reality are investigated, focussing upon the secondary phase.

Keywords

Education, Global School, E-learning, Curriculum, Digitisation, Education and ICT

1. Introduction: The World Transformed

Digitisation has changed, and is continuing apace further to change, both the nature and aspiration of educational objectives and the means and enjoyment of their achievement. The society in which the teachers and learners operate has altered radically—and will be characterised by on-going alteration. Similarly, the ways in which the transmission of information and the sharing of ideas and the stimulation of creativity may be achieved manifest a fresh educational era. This thoroughgoing surge forward represents a pivotal leap in human potential as profound as the wheel in relation to development and as significant as the book in the context of education. The participative connectedness

of all learners is something more than enabling development: it is development. But it has yet, with universally-enhancing, equity-accomplishing or profoundly humane consequences, to occur.

It is relatively easy to recognise that Digitisation changes everything but somewhat more difficult to understand just what, in practice, that means for the secondary curriculum and for its optimum delivery. The virtually general recognition that everything is transformed has yet to be matched by any fundamental reshaping of educational content, school organisation, classroom culture or institutional philosophy. Accordingly, with our heads in the cloud but with our feet firmly planted upon *terra firma*, let us explore how best that which is studied, mastered and enjoyed at the secondary phase may respond to and be served by this emerging Digital Age and the learners and teachers (i.e., everybody) therein.

1.1 Pre- and Post-Secondary

Let it be trusted that children worldwide will, in the pre-primary and primary phases, have fun achieving an understanding of how contemporary technology may work for them, along with such safeguards, supplements and subtleties as caring adults deem appropriate. Prior to commencing secondary, an easy familiarity with three languages should be accomplished—mother tongue, another language (international, if that mother tongue be otherwise) and computer talk (sign language might justifiably make up a fourth). Ideally also, a lifelong love of learning should be engendered at those early stages, based upon a shared enjoyment of the acquisition of ideas and information, implying a pre-secondary curriculum of fascination and a pedagogy of pleasure.

Let it be recognised also that, at the tertiary or post-secondary phase, Professional, Technical and Vocational Training (PTVT—see Douse, 2013) may legitimately and must inevitably come to pass, whether it be the pre-service preparation of doctors, lawyers, accountants and engineers, or apprenticeships of various natures, or dedicated short courses focussed upon specific workplace skills. While "education" undoubtedly inevitably will and indisputably should continue to occur, alongside but not to be confused with PTVT, in universities and other tertiary institutions and open learning systems, it is at the secondary school phase that, building upon elementary foundations, education in, of and for the Digital Age reaches fulfilment. Accordingly, this paper focusses upon post-primary pre-tertiary curricula.

1.2 The Distraction of "Relevance"

Every industry is being disrupted and/or enhanced and/or changed beyond all recognition. This year's skills priorities might be in areas such as device and network security, cloud-based solutions, the internet of things and network administration; next year's may well be completely different, including some fields as yet unearthed. Artificial Intelligence (AI), machine learning, invisible algorithms and companion technologies offer great growth opportunities but, as well as creating many high-paying jobs and positive spill-over effects for- the more fortunate, the threat of producing billions of low-skilled, low-waged, low-regarded workers worldwide must be recognised and should be resisted. While the fourth industrial revolution offers, for instance, new functions in information technology,

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analytics (big data) and Research and Development (R&D), the application of robotics will make some shop-floor and other current entry roles redundant, and unless businesses and governments understand and face up to the challenges, "nearly half of developed country jobs will disappear with neither trace nor replacement, with women facing twice as many redundancies as men" (Schwab, 2016).

Industry, commerce, research and academia, worldwide, urgently require relevantly skilled or readily trainable workers, looking in vain to conventional education systems to deliver them. However, just as economic growth is a pre-Digital Age obsession, so also may schooling no longer explicitly prepare people with specific discipline knowledge for situations in which they will need frequently to upgrade their skills, especially when the nature of those skills are unknowable and the mechanics of transformation unfathomable. Education has for too long been misdirected by macroeconomists—it may now come into its uncompromising own. Moreover, given that tomorrow's labour market skills demands are increasingly characterised by uncertainty, the vital distinction between "education" and "training" may valuably become a hard border (see Douse, 2005). Above all, the myth of educational input being justified by economic returns is exploded with the realisation that education's true objectives are mainly non-material.

Intangible capitalism and the post-human economy have the potential to entrench and exacerbate inequality—both within and between nations. Franklin Foer sees the consequences proceeding even further, colonising the human mind itself: "Solitary genius is replaced by the wisdom of the crowd, the networked mob enforces conformism… algorithms make it impossible to think for ourselves" (Foer, 2017; quoted by Tarnoff, 2017). This is the context in which Digital Age education must operate: it has yet to be thoroughly thought through on that basis. Perhaps Brain-Computer-Interfaces (BCI), incorporating safe, small, wireless and long-lasting cortical implants, will enable the achievement of a concomitant upgrade in human capabilities. Our earlier admonition to keep our feet firmly upon the ground applies here—advances likely to be more than one decade into the unforeseeable future should not unduly distract us now—although today's students will undoubtedly enjoy exploring the possibilities.

1.3 Only Connect

In a sense, there is the one emerging universal school—the global lifelong learning community (see Uys & Douse, 2018)—and, accordingly, talk of curricula and of teaching and learning methodologies cannot be limited to, or even focussed upon, those situations prevailing or aspired to in particular countries or communities. With universal devices and connectivity, "search" works the same, for both the distinguished computer-shy professor and the teenaged digital savvy. Moreover, as all learners and all teachers worldwide are now (about to be) in contact with one another, the educational opportunities are of a different dimension than hitherto, comprehensively shared as opposed to discriminatorily segregated. As Foer suggests, "there has never been a better time to advance a vision for how to organise technology in a way that benefits everyone" (Foer, 2017). And, as will be discussed below, this open and active participation has profound implications for the substance, creation and

transmission of information, ideas and attitudes, and will be accompanied by an intensifying realisation of the possibilities of learner-directed curricula and learning-supporting pedagogies.

2. Content and Method by Subject

Currently, the educational applications of contemporary technology are manifest in particular subject areas and so it is therein that we must look in order to ascertain the prevailing situation. The next six sub-sections run through particular secondary school subjects (interpreting that definition liberally to include "sport" and "extra-curricular") and, within each, outline the present influence of that subset of Digitisation commonly referred to acronymically as "ICT". Particular attention is then given to the examinable subject labelled, for instance, "Computer Sciences", concluding with an assessment of why the anticipated benefits of technological applications have as yet not come to pass.

2.1 Chemistry

Chemistry, as our example of a science, is a fairly obvious area for using and incorporating ICT including ingenious digital applications that might, as a Nigerian advocate puts it, "…revolutionalise the educational programmes of many countries" (Oni, 2010), especially for those in the third world, in remote schools everywhere and even individual learners. Spreadsheets and simulations, video clips, interactive learning, objects for quizzes, animation, and other kinds of multimedia learning activities, web lessons, rubrics and classroom calendars, collaborative projects, virtual field trips, educational games, and other interactive activities abound. Particular attention has been given to "visualisations in laboratories such as molecular modelling, data collection and presentation" along with "ICT use via the World Wide Web and virtual reality as well as the role of ICT for developing higher-order thinking skills, such as inquiry, graphing, and modelling… research of global standard and usefulness to be readily available over the internet, not only did this solve problems but it has made it possible to access newer, more economical and environmentally friendly (green chemistry) method of chemical synthesis, graphical representation of spectra and interpretations" (Dori, 2013). A recent module on teaching skills in the use of ICTs in education generally and Chemistry specifically (Onwu, 2013) commences with pre-assessment self-evaluation questions "that will help you test your preparedness and readiness to complete this module". No similar module has as yet been encountered for non-science teachers.

2.2 Religious Education

In this instance of a humanities subject, ICT enables, for example, speedy location of biblical passages or Muslim prayer times; accessing virtual tours (including Makkah and Kyoto), webcams, interaction with sources such as the Golden Temple at Amritsar, presenting learners' work or using a smartphone to record an interview or an instant radio broadcast. There is a range of Religious Education (RE)-specific CD Roms and other commercial ICT sources for networks and whiteboards, providing comparable resources and activities including websites such as BiblicalStudies.org.uk which hosts over 22,000 full-text theological articles and EarlyChurch.org.uk which covers church history from the close of the New Testament to the rise of the medieval Papacy (c.100-c.600 AD). The cross-linking of subjects

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means that a student studying baptism (for example) would be able to move from that of Jesus, to baptism in the early church, the medieval church, by the reformers and then to how it is understood by a range of modern theologians. In the 70s and 80s, women's, LGBTQ, ethnic and cultural studies opened up the humanities to address issues of social, political, and cultural iniquities and possibilities for re-enfranchisement: RE has, in many situations, become "contemporary ethical issues" education (see Douse, P., 2017); here too a similarly wide range of virtual sources is available.

2.3 Tok Pisin

Online study aids and intranet resources herald great changes for the future of Mother Tongue teaching, building a visual dimension to the curriculum. Students may also be able to learn other languages through all available sensory channels, allowing them to see printouts of their own voices and tune their intonation to match that of native speakers. An interesting example is that of Tok Pisin (there are various spellings—it is essentially a spoken rather than a written language) as occurring in Papua New Guinea where there are some 750 languages in some 30 different language families, spoken by a population of roughly 4 million (see the University of Sydney's *Documenting Endangered Languages of Papua New Guinea* website: other sources offer estimates ranging upwards to 1,450 local languages). In addition to recording dying languages for posterity and research, the United States Peace Corps, long active in PNG, has produced Tok Pisin Language Lessons in the form of an ebook, a linked audio, and facilities for practicing pronunciation, all at the same time. The material may be used either as a self-guided course or with the assistance of a qualified Tok Pisin tutor: native speakers, even illiterate ones in remote villages, readily take on this role, happily Skyping by solar with, for instance, eminent anthropologists, well-meaning volunteers or serious long distance language students.

2.4 Migration, Empire, People

The "Migration, Empire, People" example is a recently-added UK General Certificate of Secondary Education (in practice, Years 9 and 10) examination subject comprising a thematic study enabling students to gain an understanding of how the identity of the people of Britain has been shaped by their interaction with the wider world. Students study the importance of, for example, war, religion, government, economics, science and technology, ideas such as imperialism, social Darwinism and civilisation, and the role of individuals as they influenced Britain's dealings with the wider world. Across the disciplines involved, producers of ICT artefacts have created interactive maps and dedicated websites opening up geography (Google Earth has become the normative *mappa mundi* now in the hands of the world community), just as history students are able to participate in battles, court scenes and the lives of common peoples, free from danger or destitution. Interactive lessons are already available for "Migration, Empire, People"—one on the Vikings and Alfred the Great involving learners feeding back their preconceptions about Pre-Norman Britain, followed by a "make a summary" task looking at early Vikings, then watching a short video and making notes about the early Anglo-Saxons, before watching another short video about how the two groups interact, then complete the AD 850 and AD 878 maps and considering the impact this change would have. Pupils then to complete an exam

question, making notes from the textbook first, followed by using a mark scheme and sentence starters.

2.5 Sport, Fitness, Health

ICT is being used today for a variety of sports-related activities, including the assessment of sports injuries, detecting false starts in races, new materials and design used in tennis rackets, skis, footballs, javelins and bicycles to improve control, speed and distance, specialist clothing and footwear, including heat-reducing and lightweight materials and hydrodynamic full-body swimming suits, apps such as Coach's Eye and Sports Rules, "hawk eye" for tennis, cricket and football, websites for the advertisement of sporting events, Computer Aided Design of sailing boats, kayaks and Formula One vehicles, interactive features when watching sport, wireless technology to tackle football hooligans, weather conditions for sports such as skiing or surfing, virtual reality games for the practice of sporting techniques, sports watches and heart-rate monitor's help with keeping fit, sailing race navigation software, all-weather surfaces, drainage and roofed stadiums, safety improvements in gymnastics training, including landing areas and harnesses, video and statistical analysis helps identify areas for improvement and focuses coaching, and fitness monitoring equipment. As those who teach physical education in schools are often immersed in sport themselves, and will have encountered some of the above inventions and initiatives, ICT is utilised in these areas, including the coaching of teams and individual athletes, and in relation to class instruction, health education and sports facilities and equipment.

2.6 Extra-/Co-Curricular

Beyond the formal curriculum, some secondary schools offer a range of activities (according to its prospectus, Haydock High in England provides "a huge richness and variety of extra-curricular activities… recently included zoos, art galleries, theatres, geography field trips, castles, study visits to France, Spain and Iceland, ski trip, science club, drama productions, Art, choir, band, dance and media". This would seem to be the exception). A central problem worldwide, exacerbated in some countries by the exam culture, in others by poor teacher morale, is that the availability and take-up is often very low, for instance: "…in the UK, two in five secondary pupils don't take part in any extra-curricular activities" (Sutton Trust, 2017). The present authors believe that across the developing world, the situation is worse. In that same report, 45 per cent of secondary teachers said their school provided debating, yet just two per cent of pupils report taking part and, the Sutton Trust suggests, "…pupils from disadvantaged backgrounds are less likely to take up such activities than their better-off peers" (*ibid*). Debating is an interesting example: the production of orators was once regarded as the central educational objective (see Quintilian, circa 60 AD) and, even today, students are encouraged to enter debating contests on the basis that this will "look good on your CV" (see Douse, 2017, where the "debate as pedagogy" paradigm is touched upon). Here, as across the extra-curricular totality, imagined preparation for the world of work has encroached upon what should be opportunities for enjoyment, exploration and self-fulfilment: Digitisation may enable those true co-curricular purposes to flourish for instance through global digital interactions.

2.7 The Curious Case of "Computer Science"

Given that all curricula will be set "in the context of Digitisation", and that all subjects (and subject areas are human-created conceptions anyway) will be taught, experienced and, as necessary, tested utilising digital technologies, whether that which would be left over is sufficient for a dedicated "Computer Science" curriculum is questionable. It appears that, based upon an inspection of secondary syllabuses in a sample of countries, the subject has deteriorated from programming (the 1970s emphasis) into IT skills (how to use PowerPoint, Word, Excel et cetera), proficiencies that, it is contended, are better acquired and applied as practical elements within other subjects. Much as "every teacher is an English teacher" applied previously (especially in English-speaking countries) it is now the case that "every teacher is (becoming) a digital literate/fluent teacher", which raises the issue of how soon "specialist ICT teachers" may be phased out.

As "education" now means "education in the context of Digitisation", it follows that separate secondary "ICT lessons" (especially when involving expensive ICT equipment!) are meaningless, misleading, potentially dangerous, 20th century relics. It may be pedantic to insist that the production of, say, computer engineers or specialists in fuzzy logic is "training" but let it be acknowledged that "pedant" and "pedagogue" derive from the same deep root. As emphasised earlier, a hard border between "education" and "training", the latter being dedicated to explicit preparation for (particular areas within) the world of work, the former devoted to life-enhancing, socially-constructed self-realisation, enables both activities to occur without confusion as to their objectives. Producing computer specialists is "training"; having "Computer Science" as an educational course, or as a secondary examination subject, is archaic.

2.8 ICT: The Opportunity Unseized

Although the potential for digital technologies to transform ways of organizing the curriculum, teaching, learning and the school environment has been celebrated for some four decades, the "profound changes hoped for have not materialized and, to a great extent, these digital devices and resources are very often used as new means of transmitting content and reproducing approaches of traditional education" (UNESCO-IBE, 2015). It is as if, by mid-20th century, automobiles were still plodding only those routes trodden by horse-drawn vehicles a couple of generations previously. There is also an acknowledgement that, to date, the "instantaneous communication, the possibility of immediate access to a staggering amount of information and knowledge online, and the growing availability of digital technologies", have achieved but little "progress in educational inclusion based on the necessary changes regarding the curriculum, teachers and underlying pedagogy" (*ibid*).

Within the subject areas addressed above, and despite a widespread recognition of the potential grand-scale benefits of ICT applications, it is reported that most chemistry teachers "still see ICT as exclusively the affairs of those in computer science department (and) lack the basic computer literacy and numeracy" (Dora, 2013). If this be true of a science subject, it is reasonable to assume that such (self-perceived) deficiencies will be even more in evidence amongst non-science

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teachers. In the United Kingdom and far beyond, the road to the successful integration of ICT in RE has not been easy for many teachers, with inappropriate use of the equipment and software identified as the most frequent weakness. A vast and supplier-driven array of technologically-advanced devices are, from sport in general, utilised for physical education in schools. In language learning, where Tok Pisin was our example, as in new cross-disciplinary courses, interesting ICT initatives are promptly forthcoming. Opportunities in extra-curricular areas, other than sport, are underused in that there is tragically little learner participation. Nor, let it be added, have literature searches in any mainstream secondary teaching area unearthed evidence of significantly increased learner performance (or, less frequently assessed, student enjoyment) associated with the utilisation of ICT.

The use of contemporary technology has a limited impact on teaching and learning where teachers fail to appreciate that interactivity requires a new approach to pedagogy, lesson planning and the curriculum. Many teachers still fear some forms of technology, which prevents their making good use of them in their teaching. Some reorganise the delivery of the curriculum, but "the majority use ICT to add to or enhance their existing practices" (Loveless, 2008). The idea of identifying "educational areas for ICT intervention and formulation of corresponding ICT-in-education policies… planning for implementation—infrastructure, hardware, ICT-enhanced content, personnel training, and cost…" (Infodev, 2007) misses the present point.

While having some value in relation to word processing, presentation software, interactive video, simulations and modelling, these fragmentary props are concentrated on portions of particular subject areas and utilised by those teachers with an affinity with technological innovation. Rather than educational systems, and secondary schools within those systems, transforming themselves into Digital Age institutions, we have isolated early-21st century innovations misplaced in 20th century settings: a variety of the fairly contemporary vehicles stuck in the mud of medieval cart tracks. And that, it is submitted, is the main explanation for contemporary technology's failure to meet expectations: neither the educational systems nor most of the managers and teachers within them are 'digitally comfortable' and, consequently, each is resistant to the incorporation of isolated ICT intrusions, no matter how powerful the research and marketing behind them.

3. Towards the Transformative Curriculum

Beyond the particular, a creative, comprehensive and conceivably cosmopolitan curriculum for surviving and thriving in the Digital Age needs to evolve (as opposed to being imposed). Digitisation is not merely a coming-together of contemporary technologies but a confluence of possibilities for human fulfilment. As such, it necessitates challenging prevailing views of curriculum and, underlying all of that analyses, determining its proper ownership, if the Digital Age version is to emerge.

3.1 Process and Praxis

Digitisation has revolutionised both "learning to learn from the cognitive point of view and learning to live together from the social point of view" (to use the distinction utilised by, for instance Tedesco,

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2005). The fresh situation should allow and necessitate a transformed curriculum vision: exploring new forms of inclusion and diversification and involving on-going innovation and experimentation in teaching and learning strategies. Current limitations include factors such as public examinations, employers' and tertiary institutional requirements, teaching to the test and the demeaning power of PISA. Contemporary policy environments prize the productive and technical with educational activities outside the syllabus being squeezed out (as with the extracurricular in the previous section): 20th century emphases adrift in early third millennium waters.

Curriculum has been variously regarded as content to be transmitted, as a means of achieving specified competencies and behaviour change, or "the means by which the experience of attempting to put an educational proposal into practice is made available" (Stenhouse, 1975): essentially, curriculum as process. This model depends upon the cultivation of wisdom and meaning-making in the classroom, all too frequently, as Grundy suggests, becoming "reduced to sets of skills… the actions have become the ends; the processes have become the product. Whether or not students are able to apply the skills to make sense of the world around them is somehow overlooked" (1987). Praxis occupies the intersection between the philosophy and the practice of teaching, with the contextually-shaped curriculum evolving through the dynamic interaction of action and reflection: It is not that education is without content altogether, but that its content is co-constructed as part of and not in advance of the learning (Stommel, 2014). Digitisation necessitates and enables a transfer of curriculum ownership and, with new proprietorship, considerations of process and praxis become superfluous, as discussed below.

3.2 Digital Humanities

The thrust of the Digital Humanities Manifesto is that the "dissemination of knowledge in the arts, human and social sciences has been transformed by digital tools, techniques and media… our entire cultural legacy as a species is migrating to digital formats" and that this transformation enables and requires the "democratization of culture and scholarship… a world of fusions and frictions, in which the development and deployment of technologies, and the sorts of research questions, demands, and imaginative work that characterize the arts and humanities merge" (Digital Humanities, 2008 and 2014) While this is very much in the spirit of this present paper, regarding *humanity* itself as a value that can (re)shape the very development and use of digital tools, carries its own dangers within it.

Some academics working in the humanities, probably feeling professionally threatened, may have considered it necessary to spell out a Digital Age role. Six decades have passed since C.P. Snow's seminal *The Two Cultures and the Scientific Revolution (1959)* essay appeared but, as implied above, "Arts versus Sciences" was always an artificial disagreement. Creativity and critical thinking are no discipline's especial property: historians help in unravelling the understanding of what it is to be human—but then so do biologists, architects, astronomers and even economists. The mathematician and the chemist test out hypotheses for goodness of fit, but then so do the theologian and the poet. As a reviewer (of Foer, 2017) concludes, we can have Twitter and Turgenev: "…we can keep our humanity intact while enjoying the new tools technology has built and use politics to make them better" (Tarnoff,

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2017). In the recent sci-fi film *Arrival*, the military send in professors of, respectively, physics and linguistics to deal with visitors from an unknown planet. In that movie, the linguist and the physicist work together to achieve (spoiler alert) a happy ending. "Humanity" is by no means restricted to practitioners of the "Humanities": arts and science specialists share a common humanity.

3.3 Class

More pertinent than the alleged arts-science dichotomy is the underlying issue of class. Reproduction theorists, such as Bowles and Gintis (1976), offer an overtly deterministic—albeit convincing—view of schools, setting out how the system embodies and perpetuates the exploitation of one class by another. Taking this forward into the area of curriculum, Basil Bernstein's distinction between the "context-dependent and particularistic" restricted code of the working class and the "independent and universalistic" elaborated code of the middle class is valuable in analysing pre-Digitisation schooling. But the two forms of educational transmission analysed in "Class and pedagogies: visible and invisible" (Bernstein, 1977) attain fuzziness in the Digital Age. Bernstein's concern with the boundaries between curricular categories (areas of knowledge and subjects) and the 'degree of control teacher and pupil possess over the selection, organization, pacing and timing of the knowledge transmitted and received in the pedagogical relationship' would not have survived the onset of Digitisation. This offers genuine possibilities of breaking the link between cultural and educational codes and the content and process of education related to social class and power relations (see Bernstein, 1973). Universal connectivity straddles schools worldwide and cuts across the institutional, societal and historical factors that gave rise to pernicious socio-educational discrimination.

3.4 Education as Indoctrination

Schooling, and children experiencing it, over the centuries, been misused (nay, abused) in the service of various causes. Currently, the analysis of Thomas Piketty (2014) highlights the significant increase in social inequality and the return of patrimonial capitalism. A world increasingly characterised by rampant inequalities and by violence towards particular groups might suggest a focus on social justice through education. There is a sense that "the curriculum" should embody "what education is needed and for what type of society", related to such declarations as the sustainable development goals (UNESCO, 2017), and central to "discussions on cohesion, inclusion, equity and development… an integrated conception of education as cultural, social and economic policy, and particularly of the forms of insertion in society and the knowledge and information economy" (*ibid*). Those who currently advocate that school curricula should be focussed upon, for example, livelihoods or social justice or—the current fad—sustainable development, are good people but, despite (and in a sense because of) their goodness they are in cardinal error. This use of schools to achieve religious, military, ideological, empire-governing, developmental or environmental outcomes, no matter how well-intentioned, is akin to using them in the production of chimney sweeps or child soldiers.

Curriculum design associated with the building of more just societies, as opposed to remaining enclosed in the logic of corporate interests, remains a noble aspiration but is no longer feasible. The

claim that the teacher is "an educator with an ethical mandate… an expert orchestrator of learning environments to foster and support the development of skills" (OECD, 2013) is true only in so far that the "ethics" prohibit the proselysation: fostering skills is fine, provided that no-one's purposes, beyond those explicitly of the learner, are being served. Given that schooling has, over the centuries, been misapplied in the service of particular crusade, whether exploitative or well-intentioned, it is good that Digitisation offers an escape from education as indoctrination, albeit bringing with it heightened opportunities for exploitation, lest we all be thoughtless. Moreover, given that Digital Age labour market requirements are largely unknowable, the false notion that education is predominantly preparation for the world of work may at long last be overturned.

3.5 Whose Curriculum?

The "hidden curriculum" involving "…examinations and the social relationships of the school—the nature of the teacher-student relationship, the organization of classes, streaming…" (Jackson, 1968) is of significance here. Just as the emphasis on regimentation, on bells and time management, and on streaming are sometimes seen as preparing young people for the world of capitalist production, in the sense of the medium being the message, the technology may currently be recognised as refining the learning objectives. Indeed, what has characterised curricula from Platonic time onwards is the unchallenged external ownership. Even if teachers and technologies exert some influence over that which is laid down, the laying is conducted by politicians, bureaucrats, academics and sundry pressure groups. With Digitisation, such external ownership may be laid aside. The driving force and assumed justification for national curricula have been a country's assumed right and duty to apply education in the production of productive workers and good citizens. However, those educating to build the Nation-State or to train human resources for economic development "…seem to have exhausted their capacity to mobilize the interest of the various social actors and are unable to meet the new demands" (Jackson, 1968).

As classrooms may now be freed from labour market colonisation, and as even the noblest authorities cannot be trusted to produce curricula that do other than exploit young people, and given that all learners and all teachers worldwide are now in contact with one another, alternatives to imposed curricula become both vital and feasible. Experiments with pupil-led (or leaderless) schools have not been unbridled successes. What is advocated here—suggested by contemporary technologies rather than derived from educational philosophies—is that the (digitally-comfortable) teachers would still rally and encourage the learners but that the latter, advised by the former, would choose that which they would study. Contemporary incentives—places in prestigious colleges, praise, glittering prizes, good jobs, avoiding punishment—would give way to deeper and more personal motivations: pursuing enthusiasms, understanding aspects of the physical and intangible world, enjoying the quest for knowledge and wisdom. Accordingly, it is the learners who "own" the curriculum: given their fingertip access to virtual infinities of information and legions of fellow-students, along with their unrivalled acquaintance with their own emerging interests and fascinations, it could not be otherwise.

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3.6 The International Dimension

There is, at present, a general acceptance of curricula that reflect the autonomy of "national societies in forging a sustainable way of life respectful of the various identities and strengthening local cultures, valuing their responses to the challenges they face" (Tawil, 2013; quoted in UNESCO, 2015). National governments jealously guard their ideosyncratic domestic curriculum mandates, sometimes devoting relatively huge resources (in terms of their populations) to developing, for instance, bespoke history syllabi reflecting their country's (perceived) unique struggle for freedom and especial identity (An entity as small as the six counties of Northern Ireland has to have two such syllabi embodying competing versions of the historical reality). Religious Education curricula are similarly regarded by national decision-makers as especially distinctive and, in many countries, languages are another area of political concern. Moreover, as already recognised, governments worldwide perceive roles in using curricula to produce productive workers and good citizens, however those (presumably overlapping) categories are perceived.

Digitisation, symbolised by the Global School, signals a sharing of learning experiences and a coming together of classroom cultures. Whether universal connectivity necessarily causes universal values and references, embodied in the shared desire for a better and more solidarity-based world, along with a "strong core of universal values that reinforce meanings and practices regarding justice" (Tedesco, Opertti, & Amadio, 2013) remains as yet unproven. What is already evolving is an increased internationalisation of courses and qualification. Already, learners in many cities worldwide, as well as in refugee camps, Antarctic tents and retirement home libraries, study for some form of international bacculaureate, some higher qualification, or a MOOC purely based on interest, from beyond their particular country or geographical location. As teaching and learning are increasingly occuring across the walls of particular educational institutions, the autonomy of individual schools and systems may fade as worldwide connectivity comes to characterise the secondary experience. Moreover, this movement towards the one universal educational institution might well, thankfully, make national league tables obsolete and odious comparisons by such as PISA redundant.

That secondary age and stage learners, similar in most respects save gender, class, nationality and location, are cajoled or compelled to follow widely-differing (and often discriminatory or chauvinistic) syllabi is palpably absurd. National stipulations are rigid, especially—as already mentioned—in areas such as history, state politics and religion, not to mention perceived forthcoming labour market priorities. But Digitisation offers oceans of alternatives and seas of questioning: tides that neither edict nor entrophy may turn around (nor UNESCO usefully tabulate). Secondary education is now an undoubted international pursuit with its cosmopolitan curriculum determined by learners from the leafy suburbs of Western cities, from slums and shanty towns and from remote developing world villages. In that the learning agenda may emerge from learners' interests and enthusiasms, a matching teacher-guided and learner-determined process may evolve in parallel, again arrived at from the worldwide rather than the national level. Undoubtedly, institutions such as high-status universities will

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attempt to shape curricula through the imposition of cream-selecting criteria. It may be anticipated, and welcomed, that the power of learner-driven curricula will overcome this last night of the professorial oligarchs.

4. Conclusion: Education Transformed

Clearly, ICT has failed to deliver the anticipated surge forward in secondary educational practices and outcomes. This, it is submitted, is in large part due to the dependence upon isolated supplier-designed ICT applications in particular aspects of specific subject areas by those teachers who happen to be interested, as opposed to any kind of overall transformation of the entirety of education, as necessitated and made possible by contemporary technology. With Digitisation, we should no longer simply be talking and planning in terms of this and that infusion of ICT assisting ever more outmoded approaches and arrangements. An entire overhaul is called for, embodying contemporary technology in its connectivity, organisation, curriculum content and research, and in innovation, learning methods and management.

Such a holus bolus renovation is necessitated and enabled by Digitisation, including the emergence of what, for all intents and purposes, may be regarded as the Global School. Its particular manifestations in relation to what is to be learned—the thrust of this present paper—comprise the emergence of the transformative and transnational **Learner-Driven Curriculum**. As forthcoming job requirements are unknowable, and as misusing schools to produce "good citizens" is historically untenable, secondary curricula should and shall emerge from learners' enthusiasms, evolving beyond process and praxis. Undoubtedly this will be contested but the power of billions of autonomous, self-fulfilling learners should overcome the outdated hegemonies of exam boards, ministries, employers bodies and academic selectors, all wielding increasingly inoperative 20th century prerogatives.

This, of course, needs to be matched by the development of the convivial and constantly creative **Learning-Supporting Pedagogy**: as "education" now means "education in the context of Digitisation", the notion of "Pedagogy and Digitisation" is meaningless. Whether dealing on a one-to-one tutorial basis, guiding a conventional face-to-face class, handling a hundred or so learners in fifty locations in two dozen countries, or developing modules for future utilisation by come whomsoever may, the methodology is one of guiding and supporting as opposed to directing and supervising. This "Satnav as opposed to satrap" approach will also doubtless be contested, and by some teachers also, but here again learner-power will overcome. The teacher shall facilitate.

These materialisations, in turn, have (as illustrated) their own far-reaching implications and, while much of the detail must be determined in practice rather than advance, it is the case that:

- Teachers will embody the "digitally-based educational philosophy", conveying a confident familiarity with the readily and happily accessible contemporary technology in its wake;

- As "education" now means "education in the context of Digitisation", and as every teacher, inevitably becomes a "teacher in the context of Digitisation", the notion of a specific post-primary "Computer Studies" programme evaporates;

- Similarly, as the Global School—the universal lifelong educational experience—eventuates, selective schools, private education, trans-country comparisons and national league tables become redundant;

- In the same happy manner, PISA and suchlike vanities are overcome;

- The arts/science dichotomy evaporates;

- Class bias is overcome;

- International equity is achieved; and, bringing it all together; and

- The Digital Age secondary curriculum will manifest the (well-informed) interests and enthusiasms of secondary phase learners worldwide.

With these fundamental (some might say utopian) transformations, the substance, practice and consequences of education can and should become much more equitable, ethical and enjoyable (and far less competitive, test-oriented and world-of-work-dominated). With Digitisation, once the far-reaching possibilities are comprehended and the challenges faced, learners and teachers may come into their own. Educationally, these are the most exciting times since Socrates (the philosopher not the footballer).
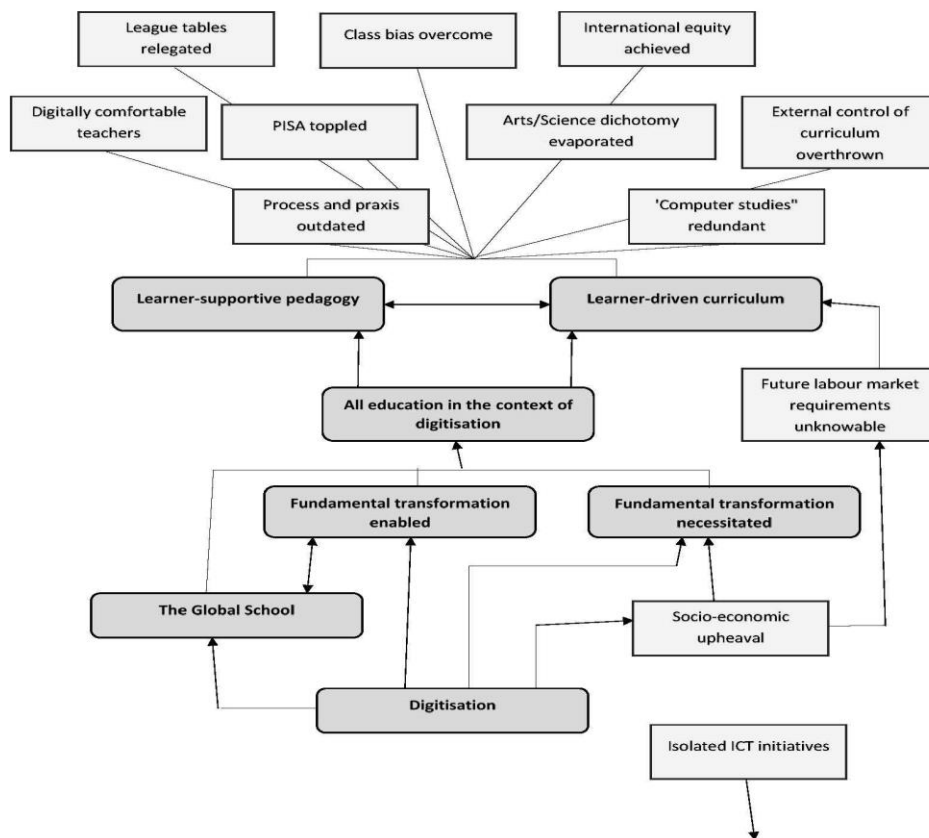

Figure 1. Education in the Time of Digitisation

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