



The Potentials of Wikimedia Projects in Digital, Information and Data Literacy Development (UK context)

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Executive Summary - Digital Literacy: the Wikimedia Way

The digital skills agenda, driven by national and transnational organisations such as UNESCO, the OECD and the World Bank, offers opportunities for the Wikimedia UK approach. Through our training programmes, open resources, and global reach we are uniquely able to contribute to and benefit from this field.

It is widely recognised by policy makers and educationalists that digital skills are essential in the modern world. The trend is to regard these as separate from more conventional cognitive skills such as 'media literacy' or 'information literacy'. There is broad agreement on what constitutes basic, intermediate and advanced digital skills, but there is less agreement on appropriate strategies to teach digital skills. It is a rapidly changing field.

Digital skills development takes place across a full range of education contexts. We mapped the opportunities for WMUK to engage in this sector. There are opportunities for outreach and growth. This is true at all standard skill levels: beginner, intermediate and advanced.

We mapped the real experience of Wikimedia users and contributors against various learning levels and outcomes described by the DCMS, OECD and others. We concluded that it is possible to assign digital skill development derived from Wiki Projects to certain standard digital skill classifications.

Skills gained and applied in our context include **computer and internet literacy, data and information literacy, content creation skills, collaboration skills, and advanced IT skills.**

There are many players active in this field, including the big tech companies, the BBC, the Mayor of London and private companies specialising in digital training. There is also public funding available.

Wikimedia UK should have a strand of work focusing on delivery of digital skills, especially at the intermediate and advanced levels.

The target groups would include the staffs of galleries, archives, libraries and museums, the tourism/heritage sector, government agencies and data holders, universities, online course providers, and associations of data holders (for example, zoos, herbaria). Wikidata offers particularly good opportunities for training and learning for content holders and their staff. Different Wikimedia projects offer different opportunities.

Wikidata, for example, is better suited to more advanced training. In the UK, for example, there is a high level of correspondence between advanced Wikimedia project use and the advanced digital skills' theoretical and operational frameworks proposed by the DCMS. More generally, Wikimedia projects are a good fit for ICT-students and could be part of the ICT curricula at every level.

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WMUK

Introduction

Well established areas of competence prior to the widespread use of computers and the internet, such as ‘information literacy’, ‘media literacy’ and ‘data literacy’ at first have co-emerged in their conceptual frameworks with the digital divide. As digital convergence gained prominence, a trend to separate digital skills and competencies, particularly from media literacy, and place them on a trajectory to serve a larger, long-term goal (digital citizenship, digital economy, digital entrepreneurship, etc.) evolved.

Primary agents influencing the digital skill agenda have become the UNESCO, OECD, European Commission, World Bank, and commissioned national-level media/digital/data/information literacy agencies and research centers helping to translate global policies into national action plans.

It is widely recognised by policy makers and educationalists that digital skills are essential in the modern world. The trend is to regard these as separate from more conventional cognitive skills such as ‘media literacy’ or ‘information literacy’. A new digital skill agenda, driven by national and transnational organisations such as UNESCO, the OECD and the World Bank, offers opportunities for the Wikimedia approach.

Despite some variations, there is broad agreement on what constitutes basic, intermediate and advanced digital skills, but there is less agreement on appropriate strategies to teach digital skills. Furthermore, the rapid development of digital tools and devices and the speed at which humanity embraces them requires more frequent remapping of skills and competencies. Working in this field requires a willingness to revise one’s approach, and to think ahead.

To understand the role that Wikimedia projects could play in improving the digital skills of individuals (and to advocate at the policy making level for the inclusion of its capacities to act as a catalyst in this field), we need to map what skills Wikimedia projects teach, and at what level they are most likely to yield the greatest competency increase.

Digital skills development takes place across a full range of education contexts: from formal institutions to non-formal provision and training to various forms of self-directed and informal learning. Mapping the opportunities for WMUK to engage in this sector allows us to develop a new strategy and for outreach and growth.

1. Overview of current competency frameworks

1.1 Definitions of digital skills

The term ‘digital skills’ refers to a range of different abilities, many of which are not only ‘skills’ *per se*, but a combination of behaviours, expertise, know-how, work habits, character traits, dispositions and critical understandings. These skills and competencies are interconnected and complementary. For instance, the PISA survey measures digital literacies as the ability to “evaluate information from several sources, assessing the credibility and utility of what is written using self-established criteria as well as the ability to solve tasks that require the reader to locate information, related to an unfamiliar context, in the presence of ambiguity and without explicit directions” (OECD, 2016).

In other words, digital literacy can be seen as the ability to read and navigate autonomously digital content. Although definitions vary, digital skills and competencies are best understood as existing on a graduated continuum from basic functional skills to higher level, specialist skills. A comprehensive study of the different frameworks and definitions¹ was carried out by EURYS UK and points out the blurred lines between competencies, capabilities and skills and between basic, intermediate and advanced skills.

For instance, the UK forum for Computing Education (UKforCE), uses SOC 2010 occupational groups to estimate which group is likely to have tasks that will require their employees to have a certain level of digital skills. The categories they use are:

- *Digital Muggle* (7% of the workforce): No digital skills required – digital technology may as well be magic;
- *Digital Citizen* (37% of the workforce): the same work skills as are required to be a full digital citizen. This is the ability to use digital technology purposefully and confidently to communicate, find information and purchase goods/services;
- *Digital Worker* (46% of the workforce): substantially more digital skills than those required for full digital citizenship but less than those of a Digital Maker. This includes, at the higher end, the ability to evaluate, configure, and use complex digital systems. Elementary programming skills such as scripting are often required for these tasks; and
- *Digital Maker* (10% of the workforce): skills to actually build digital technology (typically software development). The Digital Maker category is interpreted quite broadly to include, at the low end, for example, workers who regularly create complex Excel macros or data files for controlling 3D printers’.

BY contrast, the OECD, instead using basic, intermediate and advanced levels, uses categories depending on what groups of skills (shown in the table below) an employee should have in a certain working environment:

Generic ICT skills	access information online or use software
Specialist ICT skills	the production of ICT products and services – software, web pages, e-commerce, cloud and big data

¹ http://www.legco.gov.hk/general/english/library/stay_informed_overseas_policy_updates/digital_skills.pdf

ICT-complementary skills	the capability to process complex information, communicate with co-workers and clients, solve problems, plan in advance and adjust quickly
Foundation skills	Soft skills, based literacy and numeracy skills, cognitive skills, intra- and interpersonal skills

Table 01. *Digital skills needs of employees in a working environment, OECD*

The following chapters therefore show representative examples of different trains of thoughts, rather than trying to introduce all existing initiatives that classify digital skills.

1.1.1 Basic Skills

A recent comparative study by UNESCO² on the different approaches across the globe towards digital literacy summarizes **basic functional digital skills** as “the important entry-level functional skills required to make rudimentary use of digital devices and applications.”

As shown in the table below, the UK ‘Basic Digital Skills Framework’ (Tech Partnership, 2017), for instance, considers more intermediate skills as basic than would others do in their five areas of ‘digital capability’:

Different Basic/ Generic/ Foundational / Start-up level skills across conceptual frameworks	
World Bank	<ul style="list-style-type: none"> • Operate devices • Connect to the internet • Set up accounts and profiles • Access information and resources
OECD	<ul style="list-style-type: none"> • Access information online • Use software
International Computer Driving License (ECDL)	<ul style="list-style-type: none"> • Begin to use digital technologies • Understanding basic ICT concepts, • Adjusting settings and managing files
UK GOV (GO ON ³)	<ul style="list-style-type: none"> • Managing information: Find, manage and store digital information and content • Communicating: Communicate, interact, collaborate, share and connect with others • Transacting: Purchase and sell goods and services; organise your finances; register for and use digital government services • Problem-solving: Increase independence and confidence by solving problems using digital tools and finding solutions • Creating: Engage with communities and create basic digital content

Table 02. *Comparison of basic digital skills across diverse conceptual frameworks*

The corresponding UK level of a user with basic digital skills, as shown in the previous headline as well, would be the “Digital Citizen: skills required to be a full digital citizen. This is the ability to use

² <http://unesdoc.unesco.org/images/0025/002590/259013e.pdf>

³ Go ON UK’s definition of basic digital skills

digital technology purposefully and confidently to communicate, find information and purchase goods/services” (UKforCE).

1.1.2 Intermediate Digital Skills

“Intermediate skills”, “IT user” or “Generic digital skills” are usually focusing on a more in-depth usage of digital technologies in meaningful and beneficial ways (particularly data and digital information) and tend to incorporate a broad range of intermediate skills and competencies. As examples, the composite ‘digital literacy model’ by Canada’s ‘MediaSmarts’ Centre for Digital Literacy sets out four broad, interrelated elements, progressing from basic access, awareness and training to more sophisticated outcomes and critical understandings and can be seen as sets of digital ‘life skills’ that enable an individual to make substantive and beneficial use of online applications and services.

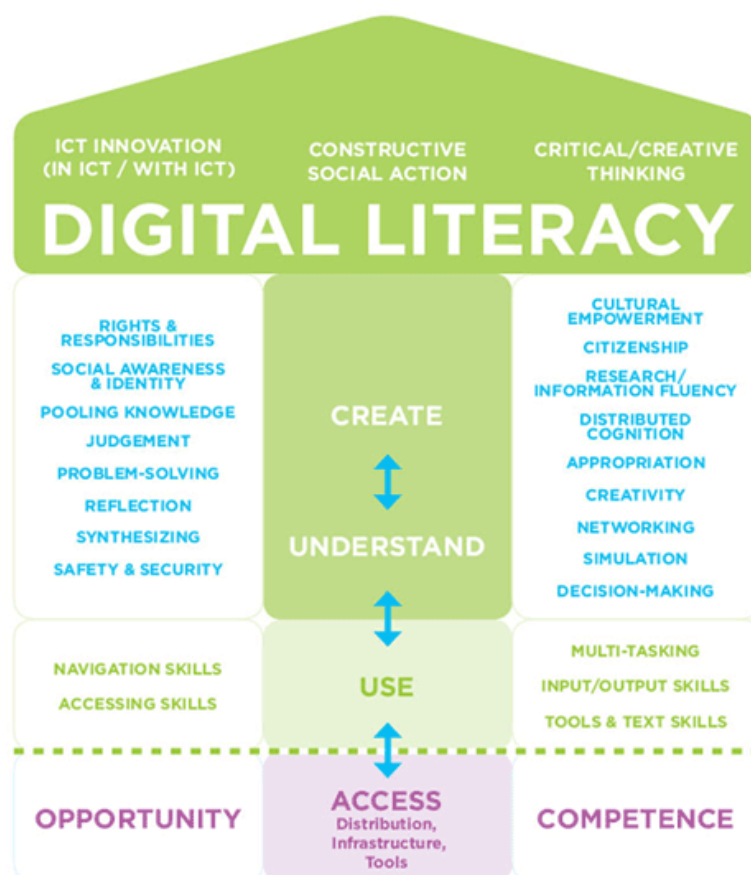


Figure 01. Digital literacy model by Canada’s ‘MediaSmarts’ Centre for Digital Literacy

Similarly, earlier European Commission studies⁴ on media literacy, that included digital literacy skills, built on four blocks: **environmental factors** (including legislative frameworks, educational approaches and access to devices/sources); **personal competencies** such as ability to use the computer and the Internet, and advanced skills to use digital devices; **critical understanding** and thinking to evaluate the information presented; and **creation and participation skills** to contribute to society as a responsible and informed citizen. Since the development, testing and reformulating of the media literacy skills between 2009-2012, the European Commission separated digital skills from media literacy and developed a conceptual reference model in 2016-2017 with a list of detailed indicators, partly reflecting the shift towards digitally inclusive society and digital governance, digital economy, improving digital skills of the labor force and entrepreneurs:

Competence area Dimension 1	Competences Dimension 2
1. Information and data literacy	<p>1.1 Browsing, searching and filtering data, information and digital content To articulate information needs, to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies.</p> <p>1.2 Evaluating data, information and digital content To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyse, interpret and critically evaluate the data, information and digital content.</p> <p>1.3 Managing data, information and digital content To organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.</p>
2. Communication and collaboration	<p>2.1 Interacting through digital technologies To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.</p> <p>2.2 Sharing through digital technologies To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices.</p> <p>2.3 Engaging in citizenship through digital technologies To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.</p> <p>2.4 Collaborating through digital technologies To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of resources and knowledge.</p> <p>2.5 Netiquette To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.</p> <p>2.6 Managing digital identity To create and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.</p>
3. Digital content creation	<p>3.1 Developing digital content To create and edit digital content in different formats, to express oneself through digital means.</p> <p>3.2 Integrating and re-elaborating digital content To modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge.</p> <p>3.3 Copyright and licences To understand how copyright and licenses apply to data, information and digital content.</p> <p>3.4 Programming To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.</p>

⁴ http://ec.europa.eu/assets/eac/culture/library/studies/literacy-criteria-report_en.pdf

4. Safety	<p>4.1 Protecting devices To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy.</p> <p>4.2 Protecting personal data and privacy To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a “Privacy policy” to inform how personal data is used.</p> <p>4.3 Protecting health and well-being To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.</p> <p>4.4 Protecting the environment To be aware of the environmental impact of digital technologies and their use.</p>
5. Problem solving	<p>5.1 Solving technical problems To identify technical problems when operating devices and using digital environments, and to solve them (from troubleshooting to solving more complex problems).</p> <p>5.2 Identifying needs and technological responses To assess needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility).</p> <p>5.3 Creatively using digital technologies To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.</p> <p>5.4 Identifying digital competence gaps To understand where one’s own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.</p>

Table 03: *The EU DigComp Conceptual reference⁵ model*

The European Digital Competence Framework corresponds with the growing importance of an individual’s ability to ‘handle’ digital data, content creation and sharing and collaboration through digital devices. This framework, however, does not distinguish clearly between basic, intermediate and specialist levels nor separates competence, capabilities and skills.

OECD

OECD’s approach to digital literacy is more aligned with 21st century skills⁶ in a digital economy. It incorporates **foundation skills**, such as soft skills (social and emotional skills including managing emotions and achieving goals), the **cognitive** domain (cognitive processes, knowledge and creativity), an **intrapersonal** domain (intellectual openness, work ethics and self-confidence); and an **interpersonal** domain (such as teamwork, collaboration and leadership). This classification is set-up as part of skills of employees in workplace settings where they ought to use digital products, and to collaborate through digital technologies in their daily work. In framework of OECD a combination of ICT-complementary and foundation skills could be regarded as “intermediate skills”.

The diffusion of ICT at the workplace is not only raising the demand for ICT specialist and generic skills. It is also changing the way work is carried out and raising the demand for **ICT-complementary skills**. These are skills that are not related to the capability to use the technology effectively but to carry out the work within the new environment shaped by ICTs, i.e.: a

⁵ <https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework>

⁶ [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/IIS\(2015\)10/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/IIS(2015)10/FINAL&docLanguage=En)

“technology-rich environment”, e.g. better capability to plan in advance and to adjust quickly and more cooperation across teams.

UK perspective

According to UKforCE, someone with intermediate digital skills would correspond to a “**Digital Worker**”, who has digital skills to evaluate, configure, and use complex digital systems and elementary programming skills such as scripting. An earlier framework by ‘The Future Digital Skills needs of the UK Economy’ reports (2013) intermediate-level digital skills as those ‘skills needed to implement and manage on a day-to-day basis the applications developed by those with advanced skills, but they may also provide contributions to the development of digital content, provision of system support and maintenance.’

1.1.3. Advanced Digital Skills

Throughout the many frameworks, the most consistency can be found in the relationship between ‘advanced level’ definitions and what skills correspond to this level, and how these skills relate to specialised (mostly ICT) working environments. Majority of the studies agree in, for instance, that specialist skills such as software development, programming or developing applications, and manage networks (e.g. OECD, Development Economics ‘The Future Digital Skills needs of the UK Economy’) would be considered as an advanced skill (basic coding, however, would be considered as intermediate or basic skill level). The emphasis at this level is on transformation, creation, building new technologies upon existing digital technology, and the conscious, strategic use of the digital devices in developing business ventures. In line with this thinking, the UKforCE’s corresponding classification of an advanced user would be the **Digital Maker**, having ‘skills to actually build digital technology (typically software development), workers who regularly create complex Excel macros or data files for controlling 3D printers’.

A recent survey by the Department for Digital, Culture, Media and Sport (DCMS) reviewing the UK’s **advanced** and **specialist digital skills**⁷ included the following indicators to measure currently available levels of skills in this category:

STRATEGY AND SERVICE DELIVERY	<ul style="list-style-type: none"> • Develop/review IT-related strategy • Management of tech resources/IT infrastructure • Use of Artificial Intelligence • (AI)/machine learning • Exploiting the Internet of Things (IoT) for business needs • User experience design and analysis • Network support
SOFTWARE AND SYSTEMS	<ul style="list-style-type: none"> • Systems development and management • Undertaking feasibility studies to design software solutions • Implementing and evaluating software • Testing and correcting software programs • Planning and maintaining database structures • Strategic exploitation of social media platforms, mobile or cloud based technologies
DESIGN	<ul style="list-style-type: none"> • Database design

⁷ <https://www.snapsurveys.com/wh/s.asp?k=150046416331>

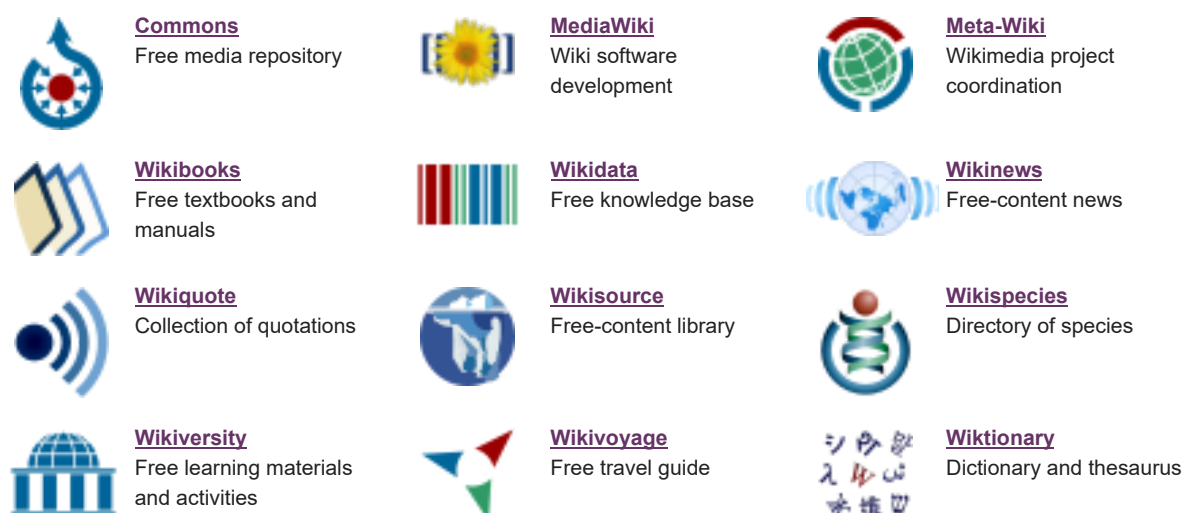
	<ul style="list-style-type: none"> • Network design • Turning complex information into easily understood content • Web/digital publishing and content production • Content design analytics and Search Engine Optimisation (SEO)
DEVELOPMENT	<ul style="list-style-type: none"> • Writing and coding programs according to specifications • Developing user interfaces • Using testing and debugging tools • Web development • Animation/games development • Agile software development
DATA AND PERFORMANCE ANALYSIS	<ul style="list-style-type: none"> • Data management and storage • Data analysis and interpretation • Exploitation of Big Data to add value to the business • Using data to build and test hypotheses • Data visualisation for the web • Using data languages and statistical analysis software • Financial data modelling
PROGRAMMING LANGUAGES	<ul style="list-style-type: none"> • C • C# • Java • JavaScript • PHP • Python • Ruby • SQL
CYBER SECURITY	<ul style="list-style-type: none"> • Identifying risks to digital assets and networks • Intrusion detection and prevention i.e. implement security for digital systems • Response to cyber threat/attack • incident management • Penetration testing
OTHER SKILLS	<ul style="list-style-type: none"> • Problem solving • Interpersonal skills • Communication • Process improvement • Risk management • Time management • Project management

Table 04: Operational framework of advanced and specialist digital skills by the UK Department for Digital, Culture, Media and Sport (DCMS)

As we can see from the table above, “other skills” here, such as communication, problem solving and interpersonal skills, can be equally considered advanced skills as well as foundation skills, as it was in the case of OECD. Regardless of the working environment where these specialised skills are applied, they did not develop simply through everyday technology use. They require a deeper contextual understanding of trends, applicability of platforms and devices, and translate functions into innovative and creative transformations for the digital economy, stimulating change within the professional or knowledge domains.

2. The potential role of the different Wikimedia projects in Digital Skill Development

Wikipedia and its sister projects have a tremendous potential in the data, information and digital literacy skill development arena. Having revisited the different conceptual frameworks, we can conclude that a simple application of any three-tier framework would be not possible within the current UK digital strategy frameworks. However, it would be possible to assign relevant areas of digital skill development in general to (and derived from) Wikiprojects to certain levels of digital skill classifications and educational initiative that are appropriate and supported in the current UK digital skill development context as well. In order to see what kind of skills are required to use or can be gained via using a given Wikimedia project, a more in-depth analysis of these projects are necessary.



The following table contains information on skills that are required in general while working with any of the wikimedia projects. As one can conclude, blocks of skills gained and applied in our context would include computer and internet literacy, data and information literacy, content creation and collaboration skills, and advanced IT-specific skills.

Competence Areas	Basic Level	Intermediate Level	Advanced Level
Computer and internet skills obtained by using the online Wiki platforms in general, including Wikipedia	<ul style="list-style-type: none"> • Create an account and a user profile • Open Source digital file types and different formats • Writing texts using visual editor • Basic page editing • Understanding project and user mainspaces, and basic Wikipage structures 	<ul style="list-style-type: none"> • Understanding of the various other projects of the Wikimedia Foundation and their potential for TransWiki use • Understanding of the MediaWiki software within the Wiki context and projects • Administration and moderation, user management, user rights management, and user groups rights 	<ul style="list-style-type: none"> • Use of MediaWiki software on external platforms • Create article templates, the use of template parameters, Parser functions in the template namespace • use specific additional editing functions such as "PrettyTextBox", "metadata, noprint", wikitables, printonly, "plainlinks". • Using bots to mass upload media and data files

		<ul style="list-style-type: none"> • Tagging pages/articles/sections for page patrolling • Manage classifications/categorisations/ • Write, edit, decorate, tag, categorize articles, use of infoboxes, Use article and box templates • Uploading and adding media files, documents, links • Account management • HTML coding and source editing, WikiText, CSS use • Using content translator tools 	
Content Creation Skills	<ul style="list-style-type: none"> • Writing of digital text • Taking photographs, creating audiovisual content • Scanning images /digitizing content • Recording digital audio files 	<ul style="list-style-type: none"> • Uploading and sharing content • Editing images, post-edit of audiovisual contents and sound files • Manipulating/converting file formats for uploads • Content categorization, building and monitoring category trees 	<ul style="list-style-type: none"> • Creating file format compatibility (e.g. 3D)
Collaboration Skills	<ul style="list-style-type: none"> • Communication, • Use of Internet Relay Chat (IRC) channel 	<ul style="list-style-type: none"> • Collaborative article/news/educational resource content creation within the same Wiki Project • Collaboration between overlapping Wiki projects • Checking notifications, using talk pages and communicating on the Wiki platforms • Tagging articles and content collaboratively: collaborative administration 	<ul style="list-style-type: none"> • Developing new Wiki Projects • Collaborative Mediawiki software development • Collaborating external sources to ease use of Wikiproject, etc. external statistical tools, hosting, wikisyntax • Consensus building in an online environment
Information Literacy Skills	<ul style="list-style-type: none"> • Understanding of reliable, verifiable sources • Understanding of the public domain • Understanding citation rules and referencing 	<ul style="list-style-type: none"> • Understanding of the licences, consents, and copyright and copyleft laws, • Using citation softwares • Searching, assessing and critically evaluate information 	<ul style="list-style-type: none"> • Page patrolling: copyright violations and management (software)
Data Literacy Skills (more details in the Wikidata section below)	<ul style="list-style-type: none"> • Understanding of data vs. metadata 	<ul style="list-style-type: none"> • Enter data, understanding data attributes • Interwiki Data: PetScan and BaGlama use for statistics, 	<ul style="list-style-type: none"> • Advanced Statistics: for pages, for links to pages, categories, files, gadgets,

			<p>messages and community activities, users,</p> <ul style="list-style-type: none"> • API and API sandbox usage, • Visualizing data and statistics through Wiki • Integrating listings from Wikimedia projects into apps/external websites • Metadata handling: export, import • Wikimedia database dumps and their XML text for articles • Understanding other file types (CSV, GPX, OBF, SQL)
IT-specific Skills			<ul style="list-style-type: none"> • Develop the MediaWiki software and its extensions: track and report bugs, suggest enhancements, review submitted features and bugs and create patches, write documentation to help other users of MediaWiki, maintain the MediaWiki codebase • System management, administration and development • Template creation to automate tasks and automated tools (e.g. CommonsHelper) • Development of bots • PHP, Python programming, MySQL database engine development Java, JavaScript

Table 05. Proposed framework of skill specifications across Wikimedia Projects (by Agnes Bruszik and Dr. Richard Nevell)

Beyond the skills that are relevant for all Wiki platforms, the individual Wikimedia sister projects offer further skills that are specific or pronounced to that project that are summarized in the table below:

Wikimedia Project	Skills Specific to a Wiki Project
<p>Wikimedia Commons</p> <p>Wikimedia Commons hosts media files such as photographs, scanned images, diagrams, animations, audio (e.g. music, spoken dialogue) and video</p>	<ul style="list-style-type: none"> • Understanding free vs. proprietary/patent-encumbered digital file types and different formats; • Understanding of the “educational context” (<i>providing knowledge; instructional or informative</i>) • Content reuse, editing/improving images, disseminate information (translating pages to other languages)

clips, along with their associated metadata.	<ul style="list-style-type: none"> • Understanding of the various other projects of the Wikimedia Foundation where interrelation is possible with Wikimedia Commons - Strong TransWiki aspect • Developing tools specific for Commons and their metadata • Create and use Commons templates • Development of Commons bots • Understanding how information is useful - categorisation
Wikinews A portal presenting reliable, unbiased and relevant free-licensed news. Articles are written in multiple languages, in collaborative and collective manner.	<ul style="list-style-type: none"> • Strong content creation aspect - writing articles, using and citing information sources • Strong collaborative skills: collective creation, decision making and problem solving • Synthesis articles require information literacy skills: using media reports from several independent sources for verifiability and neutrality • Original reporting (such as interviews, eyewitness reports, the conclusions of an investigation) requires furthermore research skills, context presentation, critical evaluation and presentation of facts • Write, edit, decorate, tag, categorize news articles, use of infoboxes • Create and use news article templates • Development of news bots
Wikibooks Wikibooks is a collaborative, instructional non-fiction book authoring website, where users from all over the world work together to write textbooks and other types of instructional books on many topics. Since 2003, Wikibooks has become one of the largest free e-book websites in the world.	<ul style="list-style-type: none"> • Writing in Wikitext or in a combination of Wikitext, HTML, and CSS • Collaboration with the overlapping Wikiversity project, cross-use with WikiCommons for image uploads • Content creation, collaborative editing, translation • Editing skills (like spelling and grammar or formatting errors) • Content creation: collaboratively write new books • Understanding of Wikibooks site specific licenses (GFDL and Creative Commons), requirements connected to the history pages, importing and merging page histories from other Wiki sites.
Wikiquote A free online compendium of sourced quotations from notable people and creative works in every language, translations of non-English quotes that is being written collaboratively by the readers.	<ul style="list-style-type: none"> • Understanding site specific licenses: Creative Commons Attribution/Share-Alike License and the GNU Free Documentation License, copyleft licensing • Strong trans-Wiki usage • Strong use of bots • Information literacy skills: digital detective work on where do quotes come from
Wikiversity A project devoted to learning resources and research for use in all levels, types, and styles of education from pre-school to university, including professional training and informal learning. Wikiversity has learning projects as a unit, instead of articles or books.	<ul style="list-style-type: none"> • Creating open educational resources and collaborative learning communities, • Create Learning resources, Learning projects, Learning models and Innovations, • Content presented under "Information science" category of Wikiversity significantly improves basic computer and digital literacy skills (on operating systems, on using and converting file formats (e.g. to "ogg" format files for audio and video), spell checkers, Java applications, video players, such as VLC, Winamp 5.35, Quicktime player, Windows Media Player, RealPlayer, on tools for image creation and manipulation, for video creation and editing, for digital audio file creation and editing, and for creating and editing text files • Using specific Wikiversity templates: such as Quiz-Simple, Quiz, HTML in wikitext, Wiki markup examples, Wikitext quick reference, etc,

	<ul style="list-style-type: none"> Using Embedded presentations - WikemPG
<p>Wiktionary</p> <p>A collaborative project to produce a free-content multilingual dictionary. It aims to describe all words of all languages using definitions and descriptions in English. Wiktionary now includes a thesaurus, a rhyme guide, phrase books, language statistics and extensive appendices, etymologies, pronunciations, sample quotations, synonyms, antonyms and translations.</p>	<ul style="list-style-type: none"> Understand site specific dual-licenses, such as Creative Commons Attribution-ShareAlike 3.0 Unported License and the GNU Free Documentation License Following strict layout conventions and inclusion criteria Hypertext book, sound files for pronunciation Creating and using site specific templates
<p>Wikispecies</p> <p>A free taxonomic reference and directory, a database aggregating the classifications and genetic family tree of all species of life, Wikispecies is describing nomenclature and taxonomy. Distribution and range data can be included in the talk page of an article, or (eventually) in Wikidata.</p>	<ul style="list-style-type: none"> Create and use site specific templates to help taxonavigation, using the Linnaean binomial nomenclature system Skills in citations and referencing Create and put templates in place all the way to genus level Editing pages: revising, cleanup, translation, adding vernacular names, matching Commons media files with WikiSpecies pages, using specialised mobile app Cross-references with WikiData
<p>Wikisource</p> <p>Wikisource is an online library of free-content texts.</p>	<ul style="list-style-type: none"> Licensing on public domain Using a unique interface Collaboration skills -at least two people need to verify source Understanding optical recognition software Proofreading process - information literacy Trans-use with Wiki Commons
<p>Wikivoyage</p> <p>A multilingual, web-based, free, up-to-date, and reliable worldwide travel guide.</p>	<ul style="list-style-type: none"> Using information sources specific to travel, itineraries, travel topics, search function Copyleft regulations Geocoding, creating static and dynamic maps Using mobile apps that use data from Wikivoyage dumps (Wikivoyage Offline, WikiSherpa, GuideWithMe, Triposo, Holiday en Travel Planner, Wiki Trip)
<p>Wikidata</p> <p>A database for various types of content. Wikidata acts as central storage for the structured data of its Wikimedia sister projects including Wikipedia, Wikivoyage, Wikisource, and others.</p>	<ul style="list-style-type: none"> Understanding basic data concepts (open data, linked data, primary and secondary data, structured data, metadata etc), data types, data functions, Understanding data characteristics: items, labels, descriptions, aliases, properties, values, identifiers, sitelinks, Importing/exporting/linking datasets Understanding site specific Creative Commons Public Domain Dedication 1.0 and other database rights (for individual facts and identifiers, such as numbers and IDs) Add manually data, or use of automated bots to enter data into Wikidata Engaging with the development of data models

	<ul style="list-style-type: none"> ● Access data using built-in tools (SPARQL and WDQS query, Resonator), external tools, or programming interfaces (API). ● Understanding RDF dump format documentation ● Reuse, or combine data with other data ● Explore and visualise your data along with data from other sources (Histropedia, Monumental, or Wikidata Graph Builder) ● Use external sources, gadgets or write applications, fix software bugs ● Collaborative Data Management skills
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Table 06. *Further digital skills specific to certain Wikimedia sister projects*

2.1 Potentials of Wikimedia projects in improving digital literacy skills at the basic level

Basic level digital skills offered by WM projects correspond with the basic level of the UK GO On framework, with the exception of “transacting” on digital devices:

- Managing information: find, manage and store digital information and content
- Communicating: communicate, interact, collaborate, share and connect with others
- Transacting: purchase and sell goods and services; organise your finances; register for and use digital government services
- Problem-solving: increase independence and confidence by solving problems using digital tools and finding solutions
- Creating: engage with communities and create basic digital content

In order to contribute to improving the basic digital literacy skills of individuals, two different training modules could be developed:

I. Basic Online Module - Contributing to Open Knowledge Online	
Computer and internet skills obtained by using the online Wiki platforms in general, including Wikipedia	<ul style="list-style-type: none"> • Create an account and a user profile • Open Source digital file types and different formats • Writing texts using visual editor • Basic page editing • Understanding the differences in project and user “namespaces”, and basic page structures on Wiki platforms
Content Creation Skills	<ul style="list-style-type: none"> • Writing digital text • Taking photographs, creating audiovisual content • Scanning images / digitizing content • Recording digital audio files
Collaboration Skills	<ul style="list-style-type: none"> • Communication in an online environment • Use of Internet Relay Chat (IRC) channel
II. Basic Information and Data Literacy Module	
Information literacy Skills	<ul style="list-style-type: none"> • Understanding licenses, consents, and copyright and copyleft laws • Using a citation software • Comparison and critical evaluation of information • Managing, searching, and storing digital information
Data Literacy Skills (more details in the Wikidata section below)	<ul style="list-style-type: none"> • Understanding of data vs. metadata

Table 07. Proposed modules to improve digital skills at the basic level through working with Wikimedia projects

These training modules, which go beyond the organisation of “Introduction to Wikipedia training workshops”, could be disseminated through online digital skill education portals. These usually provide their services at the basic level in the field of lifelong learning, informal adult education or digital inclusion. The following examples illustrative how the modules above could be integrated into syllabus of different online course providers:

A.) For a general audience:

- **Google** is investing in a **new 11 story HQ/campus near London’s Kings Cross**. At the same time, it is opening a **Digital Skills Academy** at **123 Buckingham Palace Road** in London Victoria. The Academy is a 3,700 sqm building dedicated to "educating and inspiring everyone", from school children to CEOs. The centre will teach digital skills. For now, the **online Google Digital Garage** offers a range of courses to suit different digital skills needs:
<https://learndigital.withgoogle.com/digitalgarage/topic-library>
- **Greenwich Digital Skills** offers Greenwich residents a variety of part time evening and weekend short courses to improve digital skills:
<https://www.ravensbourne.ac.uk/study-here/short-courses/greenwich-digital-skills/>
- **Learn My Way** is a website of free online courses for beginners, helping to develop digital skills to make the most of the online world. The learning platform contains content on basic digital skills, and aims to support centres with their local activity and ensure consistency of learning.
<https://www.learnmyway.com/subjects>
- **Barclays** has developed a suite of digital training courses for older children and adults. These are freely available in the UK. The Digital Driving License,[3] or DDL, is an interactive learning experience with a growing list of modules (currently 34), endorsed by City & Guilds and designed by Digital Eagles and partner tech brands such as Microsoft and IBM. It was initially developed to up-skill Barclays employees on all things digital, but is now used by clients and partners as diverse as Unite the Union, the Royal Mail, Birmingham City Council and the Department for Work and Pensions to provide a basic understanding of issues such as cyber security, digital identity and cloud computing to their colleagues and members. The DDL is available online or as an app so that it is accessible to as many people as possible and at their convenience.
<https://digital.wings.uk.barclays/for-everyone/topics-and-modules>
- **Dot Everyone:** <https://doteveryone.org.uk/our-work/defining-digital-understanding/>
 Dot Everyone works in the field of digital inclusion, and delivers training sessions on digital skills in libraries <https://doteveryone.org.uk/our-work/21st-century-libraries/>. Their research on public libraries across the country is interesting:
<https://medium.com/doteveryone/how-we-can-help-libraries-and-how-libraries-can-help-us-912b38ade2f0>
- **SCVO** is an organisation committed to supporting a wide range of digital participation projects in communities across Scotland. This work is funded by their charter fund and challenge fund, or receives in-kind support from organisations that have signed their digital participation charter. Each of them has a page on this site to tell their story.

B.) For teachers and students:

- **City & Guilds** provides programmes which are specifically focused on the use of technology in the classroom for practitioners. They have also established a community called the Think Out Loud Club for the FE sector to share experiences and good practice of digital teaching. Their ICT user qualifications enable learners to use of digital technology as part of their job or support others. Learners can progress from becoming digitally literate at Entry Level 3 to applications specialist at Level 3.

More on courses of IT use:

<https://www.cityandguilds.com/qualifications-and-apprenticeships/it#fil=uk>

- **Samsung** is working with Birmingham Metropolitan College's Harborne Academy (11-18 secondary school) to establish a **professional development centre for teachers**. Using Samsung's latest products, the Samsung Digital Academy for teachers provides three levels of training programmes to equip teachers with knowledge and skills in technology and coding. It reached over 300 teachers.

<http://www.harborneacademy.co.uk/Samsung-Digital-Academy>

- **Google's CT MOOC** (Massive Open Online Course) provides teachers with pedagogy skills so that they can integrate, apply and share Computational Thinking concepts across multiple academic subjects.

- **The Open Science Lab** is a digital learning platform for undergraduate students that brings interactive practical science to students anywhere and anytime the internet is available. The laboratory features investigations based on on-screen instruments, remote access experiments and virtual scenarios using real data. It would be interesting to see whether Wikidata, Wikispecies and Wikipedia items could be connected to these experiments:

<https://learn5.open.ac.uk/course/view.php?id=2>

- BBC Bitesize, an online revision service for **students from 15 to 16**, is accessed by more than 80 per cent of secondary school pupils and supports curricula across the UK. In 2014, a range of new computing content was added to the curriculum in England, and new training material was incorporated on Bitesize. Bitesize was updated again in 2016 with an app for tablets and smartphones that allows users to personalise their experience.

<https://www.bbc.co.uk/education>

The Bitesize modules are here:

<https://www.bbc.co.uk/education/levels/z98jmp3>

- **The Mayor of London's has a Digital Talent programme** which offers funding for a variety of training providers and educational establishments. Their focus is on digital skills for employment.

<https://www.london.gov.uk/what-we-do/business-and-economy/skills-and-training/digital-talent-programme>. There are further funds through which Mayor supports work in schools and with teachers through initiatives such as the London Schools Excellence Fund and the London Teacher Innovation Fund. These aim to build computer science expertise across the school system.

- **For students at higher education institution, in the form of a course on digital skills,** such as has been implemented at the University of Edinburgh⁸ on Web-based content (see page 4).

C.) For library-goers:

- **Public Libraries across the UK** can easily offer basic digital skill improvement via engaging library goers in Wikipedia editing, especially the elderly with specialised knowledge pools.

⁸ <http://www.docs.is.ed.ac.uk/skills/documents/3890/3890.pdf>

2.2 Intermediate-level digital skill Development in the WM context and its range of applicability

Since the UK GO on framework focuses on basic digital skills, and there is no specific framework for the intermediate level, it is more difficult to see the correspondence with initiatives that match this skill level. On the other hand, it offers freedom to set up our own frame of reference and opportunities at this level.

I. Intermediate Online Modules - Contributing to Open Knowledge Online	
Computer and internet skills obtained by using the online Wiki platforms in general, including Wikipedia	<ul style="list-style-type: none"> • Understanding of the various other projects of the Wikimedia Foundation and their potential for TransWiki use • Understanding of the MediaWiki software within the Wiki context and projects • Administration and moderation, user management, user rights management, and user groups rights • Tagging pages/articles/sections for page patrolling • Manage classifications/categorisations/ • Write, edit, decorate, tag, categorize articles, use of infoboxes, Use article and box templates • Uploading and adding media files, documents, links • Account management • HTML coding and source editing, WikiText, CSS use • Using content translator tools
Content Creation Skills	<ul style="list-style-type: none"> • Uploading and sharing content • Editing images, post-edit of audiovisual contents and sound files • Manipulating/converting file formats for uploads • Content categorization, building and monitoring category trees
Collaboration Skills	<ul style="list-style-type: none"> • Collaborative article/news/educational resource content creation within the same Wiki Project • Collaboration between overlapping Wiki projects • Checking notifications, using talk pages and communicating on the Wiki platforms • Tagging articles and content collaboratively: collaborative administration
II. Intermediate Information and Data Literacy Module	
Information literacy Skills	<ul style="list-style-type: none"> • Understanding of the licences, consents, and copyright and copyleft laws, • Using citation softwares • Searching, assessing, comparing and critically evaluate information
Data Literacy Skills (more details in the Wikidata section below)	<ul style="list-style-type: none"> • Enter data, understanding data attributes • Interwiki Data: PetScan and BaGlama use for statistics

Table 07. Proposed modules to improve digital skills at the intermediate level through working with Wikimedia projects

Gaining intermediate level skills by using WM projects requires continued Wikipedia editing and the use of Wiki projects over a period of time. It requires a more in-depth understanding of transwiki features and potentials, and a more advanced knowledge on information sources and rights of use, and data attributes. The role of Wikimedia chapters and volunteers in providing training sessions to advance skills through working with WM projects therefore remains very significant.

Some of the informal and adult educational opportunities described above under the Basic Digital Skills section are also suitable for intermediate level modules, e.g. Digital Garage. At the same time, this is the level which offers the widest possible collaboration potentials with specialised knowledge groups.

Potential Courses at the Intermediate Level	Wikiprojects involved	Target Groups - specialised knowledge groups
Computer and internet skills obtained by using the online Wiki platforms in general	Wikipedia	GLAM, Education sector, Health Agencies, Elderly Experts,
Content Creation Computer and internet skills Information literacy Skills	Wikimedia Commons	GLAM, Tourism sector, Map creators, historical research communities, Musicians, Music Educators and Choir Leads, Conductors, Composers, Animal sounds recorders
Information Literacy Skills Computer and internet skills Data Literacy Skills	Wikidata	Government Agencies and Data Holders (https://data.gov.uk/), Met Office, Transport Direct, Environment Agency, OS Open Data GLAM Data and Content Holders Universities (scientific data series from articles)
Information Literacy Skills Content Creation Computer and internet skills	Wikinews	Journalism and media students, online journalists, citizen journalists, editors associations
Collaboration Skills Information Literacy Skills Content Creation Computer and internet skills	Wikiversity	Open Universities, Online Course Providers, International Schools, e.g. Waldorf schools, Pedagogical Societies
Computer and internet skills Geoinformatics skills	Wikivoyage	Travel Agencies, Travel Writers and their Associations, booking siBooking.com, Government Data Holders: e.g. Transport Direct
Information Literacy Skills Collaboration Skills Computer and internet skills	Wikispecies	Birding Associations, Taxonomy and Nomenclator specialist groups, Zoos, Herbaria, Public and Private Gardens, and species collectors, students, scientists, teachers, selective breeders and species, plant breeders
Information Literacy Skills Collaboration Skills Computer and internet skills	Wikibooks	Cooks, recipes from Traditional and Folk Art Museums

Table 08. Proposed further modules to improve digital skills at the intermediate level through working with Wikimedia projects and specific target audiences

2.3 Advanced Level Digital Skill Development in the WM context and its range of applicability

There is a high level of correspondence between advanced Wikimedia project use and the advanced digital skills' theoretical and operational frameworks (such as the **advanced** and **specialist digital skills as defined by the** UK Department for Digital, Culture, Media and Sport (DCMS)⁹.

IT-skills, software and system development, programming, data management skills or skills to carry out complex, collaborative tasks are all matched by the use and development of the central MediaWiki software, its extensions, and databases in support of Wikidata. The table below summarises the skills WM projects offer to enhance advanced digital skills, in general:

Relevant advanced and specialist digital skills as defined by the UK Department for Digital, Culture, Media and Sport (DCMS)		Corresponding digital skills gained through engaging with WM projects
SOFTWARE AND SYSTEMS	<ul style="list-style-type: none"> • Systems development and management • Implementing and evaluating software • Testing and correcting software programs • Planning and maintaining database structures 	<ul style="list-style-type: none"> • System management, administration and development • Maintenance of MediaWiki software and its extensions, track and report bugs, suggest enhancements, review submitted features and bugs and create patches, write documentation to help other users of MediaWiki, maintain the MediaWiki codebase
DESIGN	<ul style="list-style-type: none"> • Database design • Turning complex information into easily understood content • Web/digital publishing and content production 	<ul style="list-style-type: none"> • Advanced content creation, including the creation of article templates, the use of template parameters, Parser functions in the template namespace, the use specific additional editing functions such as "PrettyTextBox", "metadata, noprint", wikitables, printonly, "plainlinks". • Wikidata design
DEVELOPMENT	<ul style="list-style-type: none"> • Writing and coding programs according to specifications • Developing user interfaces • Using testing and debugging tools 	<ul style="list-style-type: none"> • Develop the MediaWiki software and its extensions • Template creation to automate tasks and automated tools (e.g. CommonsHelper) • Development of bots • Creating file format compatibility (e.g. 3D)
DATA AND PERFORMANCE ANALYSIS	<ul style="list-style-type: none"> • Data management and storage • Data analysis and interpretation • Exploitation of Big Data to add value to the business • Data visualisation for the web 	<ul style="list-style-type: none"> • Advanced Statistics: for pages, for links to pages, categories, files, gadgets, messages and community activities, users, • API and API sandbox usage, • Visualizing data and statistics through Wiki • Integrating listings from Wikimedia projects into apps/external websites • Metadata handling: export, import

⁹ <https://www.snapsurveys.com/wh/s.asp?k=150046416331>

		<ul style="list-style-type: none"> • Wikimedia database dumps and their XML text for articles • Understanding other file types (CSV, GPX, OBF, SQL)
PROGRAMMING LANGUAGES	<ul style="list-style-type: none"> • C • C# • Java • JavaScript • PHP • Python • Ruby • SQL 	<ul style="list-style-type: none"> • PHP • Python programming • MySQL database engine development • Java • JavaScript
OTHER SKILLS	<ul style="list-style-type: none"> • Problem solving • Interpersonal skills • Communication • Process improvement 	<ul style="list-style-type: none"> • Developing new Wiki (sister) Projects • Consensus building in an online environment • Collaborative Mediawiki software development • Collaborating external sources to ease use of Wikiproject, etc. external statistical tools, hosting, wikisyntax

Table 09. Proposed modules to improve digital skills at the advanced level through working with Wikimedia projects, following the advanced and specialist digital skills as defined by the UK Department for Digital, Culture, Media and Sport (DCMS)

It is clear from the table above, that we are looking at highly specialised target groups when we are exploring the opportunities to develop advanced digital skills in the Wikimedia context. To plan the potential activities based on this inventory, we need to separate advanced ICT-specific skills and advanced data management skills (the two largest groups) and investigate potential target groups according to this distinction.

2.3.1 Advanced ICT-specific Skills

MediaWiki is a free server-based software, licensed under the GNU General Public License (GPL). It's designed to run on a large server farm for a website that gets millions of hits per day. MediaWiki uses PHP to process and display data stored in a database, such as MySQL. Pages use MediaWiki's wikitext format, so that users without knowledge of HTML or CSS can edit them easily. MediaWiki can manage image and multimedia files, too, which are stored in the filesystem. For large wikis with lots of users, MediaWiki supports caching and can be easily coupled with proxy server software.

Wikimedia projects are a good fit for ICT-students. They allow developers to carry out remote, collaborative working, between individuals or universities with special interest in open source software development. MediaWiki allows anyone to write code to access, remix and grow the open free knowledge accumulated on Wikis, to work on open data sources, including XML and SQL dumps, and to create bots to process content or to fix tasks on Wiki projects.

Wikimedia projects use a variety of languages such as PHP and JavaScript in MediaWiki and its extensions, Lua (in Templates), CSS/LESS (in skins etc), Objective-C, Swing and Java (in Mobile Apps and Kiwix), Python (in Pywikibot), C++ (in Huggle), or C# (in AWB). IT-specialists can help improve the quality of our projects through automated browser testing and continuous integration or improve the MediaWiki documentation and other essential support pages.

This is not unique to Wikimedia. MediaWiki software, an open source software, is used outside the realm of the Wikimedia projects. For example, *Baike.com*¹⁰, a social network in China and *tv tropes*¹¹, a site that catalogues television and movie plot conventions, run on MediaWiki.

Arrange of ICT-related tasks could be devised to allow **higher educational institutions to offer ICT-education**. This involves:

- Students contributing to the development of the MediaWiki and its extensions
- Students learning to build platforms based on MediaWiki or collaborating on developing new Wiki sister projects that run on MediaWiki
- Students completing specific tasks listed on MediaWiki

These could be **part of an assignment** or become **part of the ICT curricula**. **The added value of introducing MediaWiki to ICT higher education is, that it comes with an advanced information and data literacy knowledge, and with special collaboration skills.** Students would learn about:

- Open source software and open data
- Licences, consents, and copyright and copyleft laws,
- Searching, assessing, comparing and critically evaluate information
- Consensus building in an online environment
- Collaborative software development
- Collaborating on external sources, to ease use of Wikiproject, etc. external statistical tools, hosting, wikisyntax.

2.3.2 Advanced Data Management and Wikidata

In general, Wikidata can improve data handling skills. It allows people to understand, define, structure, model, link, contribute, access and visualize open data, in an open environment where researchers, content holders and developers can collaborate. Over 46 million items are on Wikidata (April, 2018), including organisations, millions of items with coordinate locations, millions of human beings and biological forms, hundreds of thousands of collection items from GLAM institutions, and collections (e.g. of proteins or newspaper articles), and many more sets of data. These datasets can, for instance, be:

- Linked / referred back to another online source (e.g. photo collection of a museum or a Wiki Commons/Wikipedia article)¹²
- Exported / downloaded / intersected for research
- Used for data visualisations (e.g. Histropedia¹³, a website that visualises different events in the form of a timeline, using a category from Wikipedia or a live query on Wikidata)
- Used to create interfaces and Wikidata-driven sites for exploring content (e.g. Crotos, where one can zoom in on a part of the world and view artworks depicting that location¹⁴)

¹⁰ <http://www.baike.com/>

¹¹ <http://tvtropes.org/>

¹² For instance:

https://www.wikidata.org/wiki/Wikidata:WikiProject_East_Asia/China_Biographical_Database_import

¹³ <http://histropedia.com/>

¹⁴ <http://zone47.com/crotos/cosmos/>

Skills of ICT and Data Students and Data Professionals

A range of ICT-related tasks could be advertised at **higher educational institutions that offer ICT-education** in a strategic way for cooperation. The following approach could be **part of a course assignment** or become **part of the ICT curricula**:

- Students contributing to the development of Wikibase, the extension that powers Wikidata
- Students working on bots that work on Wikidata
- Working on advanced statistical tools for Wikimedia project pages, for links to pages, categories, files or users, working on gadgets, tools to improve messaging functions and community activities
- Improving API and API sandbox usage
- Developing tools to visualize data and statistics through Wiki
- Integrating listings from Wikimedia projects /Wikidata into apps / external websites
- Use external sources, gadgets or write applications that run on Wikidata (e.g. using items in Wikidata with coordinate locations), fix software bugs

Adult education, professional postgraduate ICT-courses, as well as ICT teacher training could benefit from a Wikidata module. A module / assignment on Wikidata would enable student to develop advanced ICT and Data skills by:

- Understanding data concepts (open data, linked data, primary and secondary data, structured data, metadata etc), data types and data functions
- Understanding site specific Creative Commons Public Domain Dedication 1.0 and other database rights (for individual facts and identifiers, such as numbers and IDs)
- Understanding data characteristics: items, labels, descriptions, aliases, properties, values, identifiers and sitelinks
- Understanding Wikimedia database dumps and RDF dump format documentation
- Importing/exporting/linking datasets, handling data and metadata: export, import
- Engaging with the development of data models through available open data
- Exploring and visualising data along with data from other sources (e.g. Histropedia, Monumental, or Wikidata Graph Builder)
- Gaining collaborative Data Management skills with content holders and researchers

Researchers

Researchers can learn to handle, reuse, combine and visualise data from Wikidata as part of their research. Professional scientists, researchers and citizen scientists can search the intersections of data collections, e.g. linking public (governmental) or content holder data with research data.

The skills of **researchers** (particularly **PhD Students** whose education involves advanced quantitative research methods) will be enhanced in the following areas:

- Understanding data concepts (open data, linked data, primary and secondary data, structured data, metadata etc), data types, data functions
- Understanding data characteristics: items, labels, descriptions, aliases, properties, values, identifiers, sitelinks
- Prepare datasets, reconcile identifiers in different databases
- Understanding site specific Creative Commons Public Domain Dedication 1.0 and other database rights (for individual facts and identifiers, such as numbers and IDs)

- Reuse, or combine data with other data, explore and visualise data along with data from other sources (Histropedia, Monumental, or Wikidata Graph Builder)
- Add manually data, or use of automated bots to enter data into Wikidata, importing/exporting/linking datasets
- Access data using built-in tools (SPARQL and WDQS query, Resonator), external tools, or programming interfaces (API)
- Collaborative Data Management skills

Content holders

Content holders can learn to contribute and upload structured data, which, through Wikidata, will be used by high traffic websites including Wikipedia. By adding data to Wikidata, one creates a framework that helps a topic to be well covered and up to date in all Wikimedia projects in multiple languages. The data used in Wikidata has a clickable reference to its source, and can create traffic to a content holder's own website. Art collections, TED Organisation or Quora have discovered the potentials of Wikidata for directing traffic through data use to their own sources. Datasets from e.g. Art UK, the British Museum, UNESCO World Heritage Sites, National Nuclear Data Center, Beazley Archive Pottery Collection, Cuneiform Digital Library Initiative, databases on notable people, British Hillforts, Welsh listed buildings, Welsh newspapers, Scottish Witches and their trials, collections of herbaria, university databases on Enlightenment authors, or booksellers and printers, are all examples of donations to Wikidata that can be used, re-used and researched by anyone on the planet. They can be cross-checked with other data sources or can be visualised into timelines or graphs and can allow users to learn more about a subject by collating information on Wikidata, Wikipedia and Wikimedia Commons and other sources.

Normally, this skill development happens through the involvement of a Wikimedian in Residence who explores the potentials with different datasets, negotiates with content holders to release data to the open domain, and trains employees to reconcile datasets and identifiers with Wikidata or carries out this task himself for a given content holder. However, specific modules could be developed in a form of **an adult education course or professional development courses**¹⁵ specifically designed for employees of GLAM institutions and other content holders (e.g. herbaria, labs and other natural science content holders) as part of their Digital Strategy¹⁶, or through collaboration with projects that facilitate professional development at GLAMs such as the Happy Museum Project¹⁷.

The digital, data handling and information literacy skills of employees at content holders are improved in the following areas:

- Understanding data concepts (open data, linked data, primary and secondary data, structured data, metadata etc), data types, data functions
- Understanding data characteristics: items, labels, descriptions, aliases, properties, values, identifiers, sitelinks
- Understanding site specific Creative Commons Public Domain Dedication 1.0 and other database rights (for individual facts and identifiers, such as numbers and IDs)
- Importing/exporting/linking datasets, prepare datasets, reconcile identifiers in different databases

¹⁵ E.g. <http://www.vam.ac.uk/content/articles/p/professional-development-courses/>

¹⁶ E.g. Oxford's GLAM digital strategy:

<https://www.glam.ox.ac.uk/sites/default/files/glam/documents/media/GLAM%20Digital%20Strategy%202016.pdf>

¹⁷ Courses organised by the Happy Museum Project: <http://happymuseumproject.org/>

- Add manually data, or use of automated bots to enter data into Wikidata
- Explore and visualise your data along with data from other sources (Histropedia, Monumental, or Wikidata Graph Builder)
- Collaborative Data Management skills, collaborative development of data visualisation tools with researchers and developers.

3. Digital Skill Development in the context of the Wikimedia Movement

By 2030, Wikimedia's strategic direction points toward building a more just and connected, openly accessible pool of collective knowledge¹⁸. This involves the delivery of infrastructural and service improvement, an opening towards currently underrepresented communities, topics, and formats of information on Wiki, improving knowledge quality, and developing the communication and collaboration skills of individuals.

WM's potentials in the development of digital skills is enormous. In *Table 05*, we listed the sets of skills at basic, intermediate and advanced level that are improved through engaging with any Wikimedia projects. In *Table 06*, we described individual Wiki projects and their additional contribution to the field of skill development. Later, we compiled suggested modules at these levels, and identified relevant stakeholders as our target groups.

Wikimedia provides not only vertical but also horizontal directions in skill enhancements. In collecting the main groups of skills that are improved via Wikimedia projects, so far computer and internet literacy, data and information literacy, content creation and collaboration skills, and advanced IT-specific skills were identified as main areas.

Due to the focus of this exercise on the UK and a focus on digital skill development of individuals, certain factors, such as access to infrastructure (ie. basic functions such as being able to access a device or operating a device), or other environmental factors (such as educational policies, internet infrastructure, internet penetration rates, etc.) were not described due to the relatively high level of internet penetration in the UK and well developed digital education policies. Yet, we believe, that the developed framework could be further extended and applied in a global context, taking into account local circumstances and environmental factors that create a further link with the Movement Strategy and contribute to digital equity in education through Wikimedia projects. The table below summarizes these theoretical links:

WM Digital Skills Framework	2017 Movement Strategy	Digital Equity in Education	Proposed Actions
Environmental Factors (Focus on underserved communities, and Asia, Africa, Oceania, the Middle East, and Latin America)			
Availability: Internet, Digital Devices	To support knowledge equity Building the technical structures for open knowledge	Access to infrastructure, access to education and learning technologies	Collaboration with others providing access to infrastructure e.g. Microsoft, Internet in the box, Kiwix, WikiFundi

¹⁸ https://meta.wikimedia.org/wiki/Strategy/Wikimedia_movement/2017/Direction

Context: Regulations and policies, digital education, digital industry	<p>Building the partnerships that enable us to develop knowledge we can't create ourselves</p> <p>Building the social structures for open knowledge, building equitable access and participation</p>		<p>Collaboration with organisations providing access to education and learning technologies, e.g. Google Digital Garage (<i>see page 18-19</i>)</p> <p>Working with curricula developers, policymakers, and content holders</p>
Individual Factors			
Computer Use and Internet Skills	Building the socio-technical structures for open knowledge: building equitable access and participation	Digital equity	Developing basic and intermediate digital modules (<i>see table 07 on page 17 and table 08 on page 20</i>)
Data and Information Literacy	<p>Critical thinking</p> <p>Building the socio-technical structures for open knowledge, building equitable access and participation</p> <p>The exchange and reuse of information in multiple contexts</p>	Critical thinking	Developing basic, intermediate and advanced data and information literacy modules (<i>see table 07 on page 17, table 08 on page 20-21</i>)
Content creation and collaboration skills	<p>The exchange and reuse of information in multiple contexts</p> <p>Improving online collaboration and communication skills</p> <p>Offering learning materials and communities</p> <p>Moving to multimedia formats beyond text and images</p>	<p>4C: Creativity Collaboration Communication Critical thinking</p> <p>Creating content in local languages</p>	Developing specific modules for improving content creation and collaboration skills through individual Wiki projects (<i>see table 06 on page 15-16, and table 09 on page 22</i>)
Advanced IT-specific skills	<p>Building the technical structures for open knowledge</p> <p>Reach across digital formats, devices, and interfaces</p> <p>Support new formats, and new types of knowledge (e.g. multimedia formats beyond text and images)</p> <p>Improve monitoring and maintenance of MediaWiki</p>		<p>Development of the MediaWiki software and its extensions (<i>see table 10 for details</i>)</p> <p>Strategic cooperation with higher educational institutions that offer ICT-education, developing assignments and curricula requirements in ICT, ICT teacher trainings</p>

Table 11. Proposed links between the proposed framework for digital skill development, the 2017 Wikimedia Movement Strategic Direction, and the Digital Equity in Education initiative of the Wikimedia Foundation

We believe that such a framework could greatly contribute to the wider Wikimedia movement. Digital skill education as a strategic approach that envisions impact beyond Wikipedia in the Classroom projects would allow partnering up with highly impactful organisations across the globe that provide access to digital tools. Such partnerships could place WM in a position as the provider of the open knowledge and as contributor of knowledge equity (particularly in regions with low internet penetration rates, no or little access to digital infrastructure and digital education to provide basic skills).

It would also allow for a more strategic approach to the technical development and maintenance of the WM projects which face significant challenges in the near future due to platform and file format diversifications. The educational modules' content, formats and language versions will need to follow these rapid changes. This process could be facilitated by encouraging feedback loops within the framework to ensure that those with advanced level digital skills can respond to the ICT development needs of WM projects and educational modules within a strategic educational context.

The proposed framework could bring several further benefits to the movement, e.g.:

- Building links between WM, OER and digital and information literacy policies at the global level (particularly through UNESCO and the European Commission, which has developed frameworks in place for digital and information literacy)
- Provide a system of comparability of skill levels of different regions and allow for a refined strategy building to arrive at a more just distribution of skill and knowledge
- Digital skills education can become a pillar of the infrastructure of open knowledge and OER
- Institutional learning and development for WM chapters and user groups
- Increased inter-chapter collaboration in the field of education
- Capacity for adaptive management in digital skill educational content (as WM projects develop technically, diversify on digital platforms, and integrate new file formats)
- Collaboration with new stakeholder groups that could generate new forms of support to open knowledge
- Increase the number of platforms for fundraising.

We hope to generate further interest and debate with chapters and associated groups to embrace and finetune our proposed digital competence framework to one that benefits the movement as a whole. Please feel free to contact WMUK!

List of References:

The UK Digital Strategy 2017:

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ECORYS UK: DIGITAL SKILLS for the UK ECONOMY, 2016:

http://www.legco.gov.hk/general/english/library/stay_informed_overseas_policy_updates/digital_skills.pdf

NESTA: The Future of Skills:

https://www.nesta.org.uk/sites/default/files/the_future_of_skills_employment_in_2030_0.pdf

NESTA: Securing the right Skills for the Data-driven Economy, 2015

https://www.nesta.org.uk/sites/default/files/analytics_britain.pdf

The case for a systemic approach to digital skills:

<http://www.citizensonline.org.uk/wp-content/uploads/Citizens-Online-Digital-Skills-Systemic-Approach-White-Paper.pdf>

Ofcom media literacy report:

<http://stakeholders.ofcom.org.uk/market-data-research/media-literacy/>

UNESCO Working Group on Education: Digital skills for life and work, September 2017:

<http://unesdoc.unesco.org/images/0025/002590/259013e.pdf>

Evidence asked by the Lords' Committee on Digital Skills:

<https://www.parliament.uk/documents/lords-committees/digital-skills/Digital-Skills-Committee-Evidence.pdf>

Make or Break: The UK's Digital Future, report by Select Committee on Digital Skills - Report of

Session 2014–15: <https://publications.parliament.uk/pa/ld201415/ldselect/lddigital/111/11102.html>

EC media and digital literacy criteria studies:

http://ec.europa.eu/assets/eac/culture/library/studies/literacy-criteria-report_en.pdf

European Union: The Digital Competence Framework 2.0

<https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework>

OECD Working Party on Measurement and Analysis of the Digital Economy SKILLS FOR A DIGITAL WORLD, 2016:

[http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/IIS\(2015\)10/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/IIS(2015)10/FINAL&docLanguage=En)

The Department for Digital, Culture, Media and Sport (DCMS) review of the UK's advanced and specialist digital skills: <https://www.snapsurveys.com/wh/s.asp?k=15004641633>

UK Tech Partnership: Basic Digital Skills Framework Addressing the 5 areas of digital

capability: <https://www.thetechpartnership.com/basic-digital-skills/basic-digital-skills-framework/>

UK Tech Partnership: Basic Digital Skills Framework: Get Digital basic skills assessment questions:
<https://www.thetechpartnership.com/globalassets/pdfs/basic-digital-skills-standards/basic-digital-skills-assessment-questions.pdf>

Digital skills initiatives in the UK:

http://www.legco.gov.hk/general/english/library/stay_informed_overseas_policy_updates/digital_skills.pdf

UK Stakeholders in Digital Skill Development

Help for Teachers:

<http://ukforce.org.uk/resources-and-publications/help-teachers/>

UKForCE Stakeholders: <http://ukforce.org.uk/stakeholders/>

UKForCE Steering Group:

<http://ukforce.org.uk/about/steering-group/>

SCVO supporting a wide range of digital participation projects in communities across Scotland.

<https://digital.scvo.org.uk/participation/projects/>

National College for Digital Skills <https://ada.ac.uk/>

National Science Learning Centres STEM learning provide high quality teaching and learning resources to schools. <https://www.stem.org.uk/cpd>

The Association for Learning Technology improves practice, promotes research, and influences policy. It brings bringing together practitioners, researchers, and policy makers in learning technology: Association for Learning Technology (ALT)

BCS promotes wider social and economic progress through the advancement of information technology science and practice: BCS, the Chartered Institute for IT

CAS is an association of teachers, academics, industry professionals, school governors, parents: CAS – The Computing at School Working Group.

CPHC – Council for Professors and Heads of Computing

The Council of Professors and Heads of Computing exists to promote public education in Computing and its applications. It also provides a forum for those responsible for management and research in university computing departments.

CSTA – Computer Science Teachers Association

The Computer Science Teachers Association is a US-based membership organisation that supports and promotes the teaching of computer science and other computing disciplines.

Council for Digital Inclusion, which brings senior leaders from the private and charity sectors together with government, to increase collaboration and deliver initiatives to help more citizens to confidently go online and take advantage of the internet

DATA

The Design and Technology Association represents the interests of Design and Technology teachers throughout the UK.

Digitalme

Runs an Open Badge Academy, a simple and easy to use open badge platform that allows educators and the 3rd sector to boost the credibility of a young person's CV by helping students to discover, demonstrate and earn evidence-based digital badges. Providing visibility and tracking of skills progression across the key transition from education to employment. They work with schools, learning organisations and employers to use badges to recognise skills & achievements.

e-skills UK: e-skills UK is the Sector Skills Council for Business and Information Technology.

[The Digital Policy Alliance](#) (EURIM) is the politically neutral, cross-party policy voice of the internet and technology sector.

Future Learn

An online course provider from top universities and specialist organisations.

Google

Higher Education Academy Subject Centre for Computing

The HEA supports a large network of learning and teaching practitioners involved in computing throughout the UK. They provide funding, events, resources and networking opportunities with computer science learning and teaching practitioners from a variety of institutions and roles.

ITTE (Association for Information Technology in Teacher Education)

ITTE is an association of teacher educators who share an interest in improving learning through the application of digital technology in teaching and through the effective teaching of ICT as a subject.

[London Connected Learning Centre](#)

The London CLC team is made up of expert teachers, computing and multimedia specialists, trainers, technicians, filmmakers, designers and family learning tutors. We won 2014 NAACE Impact Award for Curriculum Support Services and the Association of Learning Technologist Team of the Year award in 2012. The Centre is part of the Computing for Schools Network of Excellence for the teaching of computer science and is part of the LGFL recognised Support Framework.

Naace:

Naace is the national association for everyone promoting learning with technology in a connected world.

National Science Learning Centre

The National Science Learning Centre and five regional Science Learning Centre Consortia offer science Continuing Professional Development (CPD) for teachers and technicians working with pupils aged 5 to 19.

National STEM Centre

The National STEM Centre provides a programme of professional development for teachers of computing.

[NESTA](#)

NextGen Skills

Next Gen Skills campaign's vision is for the UK's education system to equip the next generation with the knowledge needed to grow this country's digital, creative and hi-tech economy.

[Open Rights Group](#)

Campaigns on supporting the opening of public data and clarifying the definitions of involved phenomena, research into the privacy impact of open data policies and limit risks to personal privacy.

Skills Matter

Skills Matter's mission is to promote continuous learning and innovation in software through its community of software developers.

Society of Chief Librarians: <http://goscl.com/>

South West Grid for Learning

The South West Grid for Learning Trust is a not-for-profit charitable trust providing schools and other establishments with safe, secure, managed and supported connectivity and associated services, learning technologies to improve outcomes, and the toolkit for being safer online.

UK Digital Skills Task Force

[UK Gov Dept. of Digital, Culture, Media & Sport](#)

Libraries Task Force

Vital: Vital supports all educational sectors and age ranges from KS1 through to post-16 with online resources, tools and techniques; seminars, workshops, discussion forums and training; help with the creation and use of images, sound and video; and the means to use technology to support accessibility and inclusion.

Professional development for museums:

The Happy Museum project organises professional development courses for museum employees:
<http://happymuseumproject.org/>

The Victoria and Albert Museum organises professional development courses for museum employees:
<http://www.vam.ac.uk/content/articles/p/professional-development-courses/>

Professional development for Archives:

The Museums Associations organises professional development courses for museum employees:
<https://www.museumsassociation.org/professional-development>

<http://www.nationalarchives.gov.uk/education/teachers/professional-development/>
<http://www.nationalarchives.gov.uk/education/teachers/professional-development/online-cpd/>

<http://www.archives.org.uk/training.html>

Professional development for libraries:

CILIP organises professional development courses for librarians:
https://www.cilip.org.uk/members/group_content_view.asp?group=201314&id=692098

Professional Development Programs for IT, Data professionals, Managers and for the Public

https://www.rss.org.uk/RSS/Training/Public_courses/RSS/pro_dev/RSS_training_courses_sub/test_training.aspx?hkey=80752d6b-205c-4865-8068-ab827079ced2

<https://www.microsofttraining.net/ao/41/professional-development-courses.html>