Role of University Faculty Member's ICT skills in Informatization of Society through Openness Movement in Higher Education

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ABSTRACT

Purpose: *The aim of this paper is to emphasise the relevance and importance of Information and Communication Technology (ICT) skills of University Faculty community/people in educational institutions/universities, and how they can matter in complete change/transition in the Teaching/Learning process (Learning 3.0) and help Faculty in informatization of students(society) through Openness movement in Higher Education.*
Methodology: *The paper uses secondary data gathered from case studies, journals, reputed magazines, and the internet for its preparation.*
Findings: *ICT (web 2.0) has immensely contributed to changing the education scenario from obsolete and boring classroom learning to an innovative teaching /learning process.*
Research limitations/implications: *ICT Skill is a topic too vast for academics to consider researching on. Anything and everything related to Computers and the Internet is the result of some sort of ICT skill usage by some individual. Heavy cost of ICT infrastructure is also a limiting factor.*
Originality/value: *This paper is based on findings collected from reputed journal data, reputed books, reports from reputed and authorized institutions, and Ph.D. Thesis from reputed websites that is accepted worldwide.*
Paper type: *A Review Paper.*
Keywords: Skill, Higher Education, ICT, Web 2.0, Informatization, Openness, ABCD Analysis.

1. INTRODUCTION :

All round Development has been man's dream ever since he began civilised life. Rapid urbanisation, Growing congestion, and sustainability are pushing man to limits in terms of skill supply/demand and skill development in India as well as the world. Skill is defined as the ability to use one's knowledge effectively and readily in execution or performance. Skilling is a life-long process not limited to training institutes or the education sector. Learning is the process of linking, expanding, and improving data, information, knowledge and wisdom [5]. Man continuously learns new skills as age progresses and evolves into better humans. However, in a real-world / market-oriented world, skilling is a process through some trainers or resource persons. Skill is an activity inherent or learned from others that makes people's life easy. Examples of skills are typing, programming, running, batting, story writing and teaching skills. Information and Communication Technology is basic need in every department from retail stores to more complex organisations like Airports and space Explorers like ISRO. So professionals no matter what organisations they work, must possess basic ICT skills like Email, web browsing, downloading and installing new software.

2. OBJECTIVE OF THE STUDY :

(1) To investigate how Web 3.0, ubiquitously connected artificial intelligence driven smart devices can help in higher education scenarios through ICT mechanisms.
(2) To investigate the Role of ICT skills of the faculty member in digital delivery of knowledge.

(3) To Find out the possibility of On-the-job Higher Education (Learning 3.0) and propose framework for undergraduate, post graduate honors degrees.

3. METHODOLOGY :

All the Findings are derived from observations either from the information available in journals, research articles, reputed magazines, websites, and reports. The search Engines like Google scholar and Google search are the most prominent search engines used in search of Literature.

4. LITERATURE SURVEY :

The search Engines like Google scholar and Google search are the most prominent search engines used in search of Literature. Table 1 given below gives a proper idea about the topic of research and its origin.

Table 1 review of related work.

S. No.	Year	Authors	Methodology	Findings	Gaps
1.	2007	Arbo, P. , P. Benneworth [1]	Connectivism approach.	Higher education as a binding force in a region between different professionals, Government machinery, can act as knowledge centres for social, economical and cultural development of a region first, nation second and globally last.	Does not talk about religious scriptures and true knowledge hidden in them.
2.	2018	Jasemi, M., Piri, M. [2]	Literature Survey method	Paper also touches upon non-existence of globally accepted forms of knowledge or definition. This paper talks about the knowledge/Knowledge database that must be maintained in all organisations specifically in industries in any of 3 forms publication, theses, and patent depending on nature of organisations.	No mention of the origin of knowledge.
3.	2021	Yuliya Shtaltovna Christina Muzzu [3]	Literature review method	This paper puts light on problems faced by Resource people around the world in the post Covid-era where solutions can be found in Emergency E-Learning tools or skills using 6 important aspects/areas. 1. Digital tech use. 2. Digital resources sourcing, creating, sharing. 3. Teaching and learning. 4. Digital learning assessment. 5. Empowering learners through engagement. 6. Enabling learners' digital capability.	The Paper doesn't talk about cognitive skills.

4.	2018	T Wrahatnolo , Munoto [4]	Citations /Reference method.	21st-century skills are grouped into three types, namely (1) life and career skills, (2) learning and innovation skills, and (3) media skills and information skills(Digital literacy)	Numeric data or statistics unavailable.
5.	2000	Paul E. Bierly III Eric H. Kessler Edward W.Christensen [5]	Citations/reference method.	To improve understanding of the impact of organisational learning and knowledge on competitive advantage, paper proposes a framework that includes the constructs of data, information, knowledge, and wisdom.	No diagrammatic representation or linking of components.
6.	2012	M I Jawid Nazir, Aftab Haider Rizvi, Ramachandra V Pujeri [6]	Questionnaire , sampling method and Data Analysis.	After the study of the area and carrying out experiments a model is proposed saying Ease of Learning(EOL), Ease of Understanding(EOU), Amended Attentiveness(AA), Increased Interaction(II),Convenience(C) which can be controlled using multimedia in Teaching/Learning process have a significant effect on skill development process.	Smaller and less number of university students taken as respondents. Hence has geographical limitations.
7.	2014	Eugenia Smyrnova-Trybulska, Piet Kommers, Margriet Simmerling [7]	Literature review on blended learning (E-learning) and its advantages.	1. Explanation of competence, skill and learning. 2. Reason for choosing distance education over other modes. 3. Supports digital learning without support of data.	No mathematical proof in above literature. It would have been great if author had put some data to support the views or arguments.
8.	1998	Davenport, T. Prusak, L. [8]	Literature survey on organisational knowledge	1. Definition of organisational knowledge. 2. Different types of knowledge.	No statistics, diagrams showing different forms of knowledge and their relationship.
9.	1998	M Gibbons [9]	Literature survey on different modes of higher	Changing dynamics of relevance of higher education, social responsibility, partnerships and alliances leading to competitions and collaborations.	Too little content on virtual universities.

			education and relevance.		
10.	2016	G Vijayudu [10]	Literature Survey of Higher Education.	Challenges or problems facing Higher education, stress on Value based Education, Government schemes like RUSA, PMEGP, RGUMY, Skill development missions.	No diagrammatic model representations.
11.	2003	Heather Bircham.[11]	Theoretical framework.	The kind of question structure has an effect on knowledge outcome or sharing by the recipient of the question.	No supporting numeric data.
12.	2017	Wolhunter [12]	Literature review	The paper talks about different forces/factors influencing Education policy. Detailed explanation of past, present and future of Education scenarios. Challenges coming.	No statistics on Education or diagrammatic representations.
13.	2012	Husain, F. [13]	Imagination or Cognition method.	Mention of web 3.0 and some of the prototype e-learning 3.0 management systems.	No clear cut idea/model about web 3.0 and E-Learning 3.0.

The skill of any working professional can be classified as Generic skills and Technical skills (Domain skills) [14] and this applies to all professional fields including teaching. And Teachers/Faculty need to have 12 Generic Skills to do efficient teaching. They are

a) Oral and Written Communication [15]
b) Research and Innovation [15]
c) Problem Solving [15]
d) Commitment to quality [15]
e) Information and Communication Technology (ICT) [15]
f) Critical Evaluation [15]
g) Team Work [15]
h) Adaptability and Sustainability [15]
i) Independent Lifelong Learning [15]
j) Leadership and Decision-making [15]
k) Ethical Standards [15]
l) Responsibility and Accountability [15].

Numerous definitions have been proposed for information and communication technology, it can be said that information and communication technology according to [16] is defined as

- Includes issues related to science, advanced topics and computer technology, computer design, implementation of information systems, and its applications [16].
- Is a combination of traditional knowledge of computer and communications technology to store, process, and transfer any data (including text, audio, image, video) [16].

Education is process of facilitating learning in other words acquisition of knowledge, skills, values, morals, beliefs, habits and personal development [17]. Education started as the transmission of cultural heritage from one generation to next. New age Education goals include liberation of learners, critical thinking about provided information, skills (vocational and general) needed for modern society [17]. Basically, there are 3 types of Education. Formal Education, Informal Education, and Non-formal Education are these types. Formal Education is a process where a student or learner goes to some institute for learning and a Faculty or resource person is delivering some information to be grasped by learners. In active learning, both students and Faculty get some knowledge whereas in passive learning only one person gets knowledge. Informal Education is obtained outside the academic framework

most probably from parents, print-audio-video media, or websites. Non-formal Education is temporary courses that one attends to get some additional skills for getting jobs or doing business.

[18] Defines "Informatization of education is a set of interrelated organisational and legal, socio-economic, educational, methodological, scientific-technical, industrial and management processes. These processes are aimed at providing information, computing, and telecommunication needs (other needs related to the implementation of methods and tools of information and communication technologies — ICT) of participants of the educational process, as well as those who manage and maintain this process (including those who provide its scientific and methodological support and development) [18]".

[18] Also discusses "Primary goals of informatization of education we have to include the following components as:

- establishment of skills of self-education and self-realisation;
- advancement of the potential of each person, thereby development of intellectual potential of the nation;
- development of the educational spectrum of services for people with special needs;
- rise in the quality of training or Higher education for it provides favourable conditions;
- creation of new pedagogical tools ;
- increasing the aptitude to analyse the extended knowledge and skills of students;
- establishment of the society with the informatively experienced population; "

Informatization of education is regarded as an area of pedagogical science, which creates a certain type of integrity, providing the educational sector with the methodology, theory and practice to perfect and optimise the use of ICT tools in comfortable and health-saving conditions [19].

Table 2 below gives the shift in the role of Faculties in the past and present context of Education described in paper Majumdar, S. (2015):

	Changes in Teachers' Roles	
	From	**To**
1.	The transmitter of Knowledge	Guide & Facilitator of Knowledge [21]
2.	Controller of Learning	Creator of Learning Environment [21]
3.	Always Expert	Collaborator & Co-learner [21]
4.	Learning to use ICT	Using ICT to Enhance Learning [21]
5.	Didactive/Expository	Interactive/Experiential/Explorator [21]

The factors that influence the development of the modern stage of informatization of education are listed below.

(1) Globalisation of information interaction in synchronous and asynchronous modes [20].

(2) Pedagogical technologies and information and communication technologies merge to become same and help one another to penetrate into the masses or population [20].

(3) Conflict of Individual reality versus virtual reality driving physical, social and mental aspects of individual and world around him [20].

(4) Network information dependence of the individual on:

i. Information interaction with anonymous partners, both real and virtual [20];
ii. Use of information-loaded, eye-catching, old fashioned information resources[20];
iii. Forceful promotion in the process of virtual management of objects and events[20];
iv. Uncontrolled production of fake information [20].

(5) Individual suffering from the condition called as "mental infantilism" for losing individual motivation for ones' presence in the real world and distancing from communication with people which entails greater danger to the mental health of the person.

ICT skills in relation to Modern day university Faculty's role:
(1) ICT skills of the University Faculty member can help him to achieve the role of Guide and Facilitator of Knowledge by sharing journal articles and other resources such as PowerPoint presentations, Annual study reports, and e-books by well-recognized authors and institutions like ILO, UNESCO, NASSCOM, MHRD, MICROSOFT.
(2) Creation of the Learning Environment by the Faculty community is influenced by Andragogical and technological factors. Andragogical methods are in Faculty's control, that is how he/she wants to deliver the lecture or share information, make learning interesting, and use advanced information technologies or software available right now. Technological factors like connectivity issues, satellite failures, protocol mismatch, hardware issues, and copyright issues, can influence the interaction between Faculty and a Student.
(3) Collaborator and Co-learner is the new Role given to Faculty as Collaborator and Co-learner would make students at ease with the Faculty. The new role would make the entire environment relaxed and facilitate greater interactions among students and Faculty. Free and Open interactions would encourage students to ask questions regarding subjects or personal matters. Faculty would also be involved in investigating solutions to current problems along with the students. Hence there is learning happening in students as well as Faculties. Hence we can say students and Faculty as learners and better learners.
(4) Using ICT to enhance Learning can be done using Newer Apps and Tools like Google form for conducting tests and getting survey data, Cisco Webex and Google meet for conducting online classes, Smart Boards for Attractive Presentations, Google Drive for storing data/information permanently, Google platform for almost any work.
(5) Faculty today has to be Fully interactive hence if he is "actively" using technologies (ICT) like Google Meet or Cisco Webex and WhatsApp Messengers that means Faculty is sufficiently interactive and responding to student concerns. ICT technologies would make a Faculty to be Fully explorer of knowledge and Wisdom seeking as most of the search technologies like Google scholar are linked to knowledge sources.
All the above is happening online because of the wonder called "Web 2.0"
The term "Web 2.0" is commonly associated with web applications that facilitate interactive information sharing, interoperability, user-centred design, and collaboration on the World Wide Web [22]. A "Web 2.0" site allows its users to interact with other users or to change website content, in contrast to non-interactive websites where users are limited to the passive viewing of information that is provided to them [22].

Characteristics of web 2.0:
- Collaboration [22].
- Openness [22].
- Modularity [22].
- User Control [22].
- Identity [22].
- Evolving Content [22].

The characteristics listed above help us to solve the education-related problem in the following ways:
a. Some of the best available collaboration tools in web 2.0 like 1. Social Networks 2. Blogs 3. RSS and Aggregators 4. Micro Blogging 5. Content Rating 6. Photo Sharing 7. Wiki 8. Podcast 9. Bookmarks 10. Virtual World 11. Video-Sharing, helps faculty to create, collaborate, edit, categorise, exchange, and promote".
b. The openness of web 2.0 is the concept that emerges with the 'open science' or 'wiki science' or 'Science 2.0' theory that nobody owns knowledge or content and anyone can modify anything - from programming code, journal articles, songs, video [23]. So openness can be further applied to different aspects like

- Openness to 'experience' [23]
- Openness to criticism [23]
- Openness to interpretation [23]
- Openness to the Other [23]
- Open science communications technologies [23]
- Openness=freedom [23]
- Open science governance [23].

c. The modularity feature of Web 2.0 is contradiction to monolithic (composed all in one piece). Users are able to pick and choose from a set of interoperating components in order to build something that meets their needs [24].

d. In user control characteristics, the user can exercise what he wants to see and how he wants to see it. The user is the ultimate authority for controlling the content and mode of transmission. Once Faculty becomes the admin of Web 2.0 Tools he can control other users' participation levels and track and bolster the speed of work of students by sending automated or timer set commands to targeted Students.

e. The user's Identity can be increasingly manipulated or changed according to the User's wish to suit the scenario. Hence Faculty sometimes may not be interested in revealing their identity to a student in order to check up on the activities of students so they can change the profile names whenever he or she wishes to hide from the students and come back to real profile names whenever he wants them to know his real name.

f. Evolving content is another reason why web 2.0 has been this popular. A dynamic and newer addition to kinds of content ranging from static text to live video streaming has made Web content nowadays a mesmerizing experience. The entire Universe is accessible at the click of a button.

Owing to these characteristics of Web 2.0 and the Internet platforms, ICT tools have empowered Faculty member to efficiently manage and coordinate the online classroom for teaching or learning environment.

"Connectionism" is a new term used now, since every device is probably connected to the Internet and using Information technology solutions we can use solutions developed in some cities say San Francisco(USA) to solve problems in the classroom environment in Mangalore(India) [18].

Contextual learning means drawing inspiration from the outside world and applying real-world strategies and methods to academic problems [25].

Educational Fundamentalism should be totally disapproved of in all kinds of learning. Educational Fundamentalism is always preaching one side of the story or approach or ideology or thinking [26].

Information service of education allows actors of the system to collect and store data of various components in the education process that is happening in the education scenario and disseminate it to the public [26].

Novelty, dynamism, and diversity are the key properties of information, which directly affect the content, methods, and forms of education [27].

In the modern theory of education, it is necessary to integrate the ideas of several didactic paradigms: Behaviourism→Cognitivism→Constructivism→Connectivism [28]. Behaviourism is more on behaviour or method of learning than the content of learning. Cognitivism means more on scientific facts and reasoning than on methods and finding connections between existing knowledge. Constructivism is a phenomenon where learners take away facts and information and construct new knowledge or information. Connectivism is the art of connecting old knowledge with newer information and knowledge. So the network is built using this connection that forms a network of logic with brain activity as a central concept. Learning can also be classified as Cognitive, Affective and Psychomotor skills. Affective learning skills are those skills which are guided by beliefs, attitudes, interests and motivation and values which require a valuation or response of different things according to individual interests and beliefs. Psychomotor learning is demonstrated by physical skills such as movement, speed, and strength which require entire body and mind co-ordination [29].

5. RELATED WORK :

For all the Findings or Observations, the researcher has used Google scholar or Google search as search engine.

Table 3 below gives gist of keyword related to research topic and their findings.

S. No	Keywords	Issues/Findings/Observations/Current trends	Research Gap/Future trends
1.	ICT	Research [30], Collaborative learning [31], Active Engagement [32], Knowledge formation [33], Learnability [34], Construction of knowledge [35], self-Efficacy [36], vertical training [37], Employability [38], Centrality [39], Re-skilling [40], Educational change [41], reform [42], accessibility [43],learner-faculty interaction [44],anytime-anywhere [45],student-centred [46] , self-directed learning [47], creative learning environment [48], collaborative learning [49], distance learning environment [50], higher-order skills [51], critical thinking [52], improve teaching [53], learning quality [54], sustainable development [55], blended learning [56], Adjunct e-learning [57], Fully online learning [58], synchronous collaboration [59] , Asynchronous collaboration [60], individualised learning [61].	Web 3.0,5G, Augmented reality and virtual reality combination, Artificial intelligence, Robotics, Near Field communication, Android/Smart devices and connected applications (ubiquitous computing).
2.	Informatization	Creativity [62], critical thinking [63], cognitive abilities [64], unconventional decisions [65], self-determination [66], self-realisation [67], information society [68], competitiveness [69], e-servicing [70], e-society [71], e-policy [72], e-democracy [73], e-governance [74], e-health [75], e-learning [76], e-commerce [77], e-banking [78].	Complete digitalisation.
3.	Higher Education	Sharing knowledge [79], continuous quality improvement [80], giving and taking [81], uniting and separating [82], dictating and following [82], acting and enduring [82], fixed and movable [82], deciding and setting free [82], Economic growth [83], Prosperity [84], Knowledge-Economy [85], self-actualisation [86], learn skills [87], socialise [88], partnership [89], Information technology [90], skilling [91], Employment [92], Boost Self-confidence [93], life-long learning [94], personal Development [95], Reform [96], Financing [97], global mobility [98], interactive teaching techniques [99], Knowledge [100], learner-centric [101].	Learning 3.0/Google University app/digital University/Skill degree certificates (A-Z Level)/Microsoft University/Oracle University.
4.	Openness in Higher Education	Open Education Resources(OER) [102],Open society [103],Sharing culture [104],Open access [105],open-mindedness [106],less restriction policies [107],guidelines of community use [108],modes of licensing [109],standard of interoperability [110],open format [110],open software [110],open-licensed [110],self-learning [110],personal maturation [110],self-determined processes [110],global education[110],authorization [110],massive open	Learning 3.x/On-the-job Education, Honours degrees, Honours post-graduation.

		online courses [110],Pedagogical reform [110],innovative solutions [110],research-based learning [111],multi-perspective views [112],thoughtful thinking [113],polylogical research [110],transparency [114],democratically oriented [115],transparency and awareness [116],reorganisation of academic tribes [117],digitization [118],Scientific Revolutions [119],Open Scholar [120],open educators [121],Open designer [121],OER expert [121],open Assessment [121],Reuse [122], Revise [122], Remix [122], Retain [122],and Redistribute [122],; The Open University [123];The Open Classroom [125]; Open Courseware [124]; Open Education [123]	

6. CURRENT STATUS OF THE SYSTEM :

Currently the system is inflexible where management and Faculties are having all the say in various aspects of Education like Educational resources used in the course, syllabus formulation, curricula formation, and conduct of the Assessment process.

7. ANALYSIS OF RESEARCH GAPS :

Higher Education should be open to up-gradation and must be given the flexibility to change as Technology changes rapidly.' Openness in Higher Education is the sum of all aspects like Openness in the syllabus, openness in the curriculum, openness in Assessment, and openness in the Technological and Educational resources. Openness is an anti-ownership and anti-profiteering concept. Openness is brought about by accepting and approving contributions from all kinds of people in society. Openness in Education can easily be brought about by the technological mass connectivity, change in management attitude, and efforts of the people in the society. People in the society mean policymakers, all citizens of the country/state/city, and visiting tourists of a place or nation.

As more and more people are connected through smart devices, 5G arrival in the world, cost of Higher education increasing tremendously and mobility for research work/Learning/Work would happen, this would make people unavailable at one location to carry their education forward. So there needs an effort in opening the system which now in India is closed in most education institutions, hence initially or near future we would see digital universities mushrooming in the country. After that big ski-tech companies would step-in and enter the market then we would have Google University, L&T University, Toyota University, several other domain specific universities to impart job ready skills for growing population. In the long term scenario, learning 3.0 and open movement in higher education would pick up pace and eventually we would have on-the job Education becoming the norm and these Government/Government authorised big sci-tech companies giving either giving skill certificates or skill degrees certificates for their learning outcomes. So there is Research Gap that is existing in current Literature are:

- Research Gap 1: To connect all the next generation technologies like AI, Machine learning, Robotics, Smart Devices which is Ubiquitous computing and use it and combined power of Web 3.0, 5G for learning using ICT mechanism.
- Research Gap 2: To Formulate plan for Digital University and Learning 3.0(Any-where, Any-How, Any-Time, Any-Body, Any-Means Learning).
- Research Gap 3: To find out possibility of alternate Degree (On-the-job Degree/Learning 3.x) programmers by working in reputed or international or Government certified institutions.

8. RESEARCH AGENDA :

i. How smart devices would connect to give us a fully connected world using 5G/Web 3.0 Framework/ubiquitous computing?
ii. How different aspects of life would be fully online/digitized including Universities and Learning Institutions to improve ease of living there by helping in ease of learning?

iii. How can learning 3.0 be implemented to impart true knowledge?
iv. How knowledge created during working in an organization would help the knowledge database (reputed journals)/Wikipedia/Google scholar of the world?

9. FINAL RESEARCH TOPIC :

Based on research gaps, current findings and keywords related to education field and openness to achieve maximum coverage, an alternative or new framework can be proposed to set up learning 3.0 universities which make students do work in companies or institutions then assess them based on their performance in various chores assigned to them in those offices or organisations.

10. LIMITATIONS OF THE RESEARCH :

Limitation of the proposal is that Government or Existent Government Universities has to first provide Technical support for these companies in giving degrees or topics for learning/working/Researching. If Government or Existing Government Universities do not monitor these companies, these entities would indulge in malpractices or do unfair business with learners creating confusion in the mechanism. So Government should strictly keep an eye on quality of work that is done by learners before giving degrees.

11. ABCD ANALYSIS :

ABCD analysis is represented with advantages, benefits, constraints, and disadvantages in a systematic manner [126-127]. **Table 4** below gives Advantages, Benefits, Constraints and Disadvantages of proposed system in separate cells.

ADVANTAGES	**BENEFITS**
Learner could get to know the real world problem. Job experience before getting permanent job. Stipend could also be paid depending on the work, learner is able to do.	Knowledge of learners gets increased. Would help in knowledge creation also. Fast Informatization of population. Industries get large number of trainees/Apprentice for less payment. Reduces input cost of Companies/Organisation.
CONSTRAINTS	**DISADVANTAGES**
Insecurity of people in society for new model of learning. No reform comes without cost.	All organisations may not in a position either financially, socially or sentimentally to enrol trainees/Apprentice.

12. SUGGESTIONS FOR THE RESEARCH :

Since most of the components of the Framework (5G/web 3.0/Learning 3.0) is not available in the market so research is would be an effort in proposing a future ready Framework for Universities that would solve most of the problems existing in current University framework.

13. CONCLUSION :

Long and strenuous exercise of classroom teaching has been replaced by powerful ICT tools which make the teaching jobs easier and more interesting. Different scenarios may require the usage of different tools. Whatever the tool is, the idea is to make the learning environment more interactive and engaging. Thus, ICT usage can transform the traditional knowledge delivery classroom into a knowledge creation structure by student-Faculty member engagement. Once the entire population is connected, we would have digital universities in the near future where students need not go to campus daily and but can do work in regular hours and do degrees in these universities at his convenience. Long term prediction is that because of governments push to up-skill the entire population we would have sci-tech innovation cum services/product universities would support the initiative for it sees good opportunity to make good money.

REFERENCES :

[1] Arbo, P. P. Benneworth (2007), "Understanding the Regional Contribution of Higher Education Institutions: A Literature Review", *OECD Education Working Papers, OECD Publishing*, *9*(4), 9-76. Google Scholar↗ CrossRef↗

[2] Jasemi, M., & Piri, M. (2018). Investigating knowledge management practices in a successful research and development organization. *Journal of Optimization in Industrial Engineering*, *11*(2), 101-105. Google Scholar↗ CrossRef↗

[3] Shtaltovna, Y., & Muzzu, C. (2021). Teaching Digitally-Ready Soft Skills for Employability: A review of the COVID-semester online-teaching strategies. *GiLE Journal of Skills Development*, *1*(2), 58-67. Google Scholar↗ CrossRef↗

[4] Wrahatnolo, T. (2018). 21st centuries skill implication on educational system. In *IOP Conference Series: Materials Science and Engineering*. *IOP Publishing*, *296*(1), 1-7. Google Scholar↗ CrossRef↗

[5] Bierly, P. E., Kessler, E. H., & Christensen, E. W. (2000). Organisational learning, knowledge and wisdom. *Journal of organisational change management*, *13*(6), 595-618. Google Scholar↗ CrossRef↗

[6] Nazir, M. J., Rizvi, A. H., & Pujeri, R. V. (2012). Skill development in multimedia based learning environments in higher education: An operational model. *International Journal of Information and Communication Technology Research*, *2*(11), 820-828. Google Scholar↗

[7] Kommers, P., & Simmerling, M. (2014). Eugenia Smyrnova-Trybulska. *Int. J. Cont. Engineering Education and Life-Long Learning*, *24*(3/4), 213-218. Google Scholar↗

[8] Davenport, T. H., & Prusak, L. (1998). Working knowledge: How organizations manage what they know (pp. 1-15). Harvard Business Press. Google Scholar↗ CrossRef↗

[9] Gibbons, M. (1998). Higher education relevance in the 21st century (pp. 1-73). World Bank Google Scholar↗

[10] Vijayudu, G. (2016). Higher education and skill development for faster economic growth. *International Journal in Management and Social Science (IJMSS)*, *4*(5), 48-54. Google Scholar↗

[11] Bircham-Connolly, H. J. (2007). Structured articulation of knowledge: The influence of question response structure on recipient attitude. The University of Waikato. New Zealand. pp 1-306. Retrieved from https://researchcommons.waikato.ac.nz/bitstream/handle/10289/2539/thesis.pdf?sequence=2 Google Scholar↗ CrossRef↗

[12] Wolhuter, C. (2017). Economics and Comparative and International Education: Past, Present, Future. *Bulgarian Comparative Education Society*, *15*(1),17-23. Google Scholar↗

[13] Hussain, F. (2012). E-Learning 3.0 = E-Learning 2.0+ Web 3.0?. *International Association for Development of the Information Society*, *3*(3), 39-47. Google Scholar↗

[14] Crespí, P. DEVELOPING GENERIC SKILLS AT THE HIGHER EDUCATION. *INTCESS 2020-7th International Conference on Education and Social Sciences*,*7*(1),519-523. Google Scholar↗

[15] Sandoval, L., & Ormazábal, M. (2021). The Generic skills challenge for higher education institutions: Experience of public universities in Chile. Tuning Journal for Higher Education, 8(2), 55-83. Google Scholar↗

[16] Saberi, A., & Khademi, B. (2015). Explaining the Role of Information Technology in Human Resource Development-Case Study: Staff and Faculty Members of Islamic Azad University, Darab. *International journal of economy management and social science*, *4*(1), 67-74. Google Scholar↗

[17] Education.Retrieved from https://en.wikipedia.org/wiki/Education on June 14, 2022.

[18] Fedorenko, E. H., Velychko, V. Y., Stopkin, A. V., & Chorna, A. V. (2019). Informatization of education as a pledge of the existence and development of a modern higher education. *Pedagogy of higher and secondary schools*, *52*(1), 5-21. Google Scholar↗ CrossRef↗

[19] Natalia V. G. (2018), Informatization of education, *The Espacios Magazine*, *39*(20), 6-12. Google Scholar↗

[20] Robert, I. (2018). Didactic-technological paradigms in informatization of education. *SHS Web of Conferences*, *55*(1), 1-9. Google Scholar↗ CrossRef↗

[21] Majumdar, S. (2015). Emerging trends in ICT for education & training. *Gen. Asia Pacific Reg. IVETA*,*1*(1), 1-13. Google Scholar↗

[22] Paily, M. U. (2013). Creating constructivist learning environment: Role of "Web 2.0" technology. *International Forum of Teaching and Studies*, *9*(1), 39-50. Google Scholar↗

[23] Peters, M. A. (2010). Openness, Web 2.0 technology, and open science. Policy futures in education, 8(5), 567-574. Google Scholar↗ CrossRef↗

[24] Hanif N, M. (2009). Need for Web 2.0 Technology for the Libraries, *CALIBER 2009*,*7*(1),330-336. Google Scholar↗

[25] Qizi, S. Z. M. (2021). Pedagogical Mechanisms Of The Formation Of The Social Outlook Of Future Teachers In The Context Of The Informatization Of Education. *The American Journal of Applied sciences*, *3*(04), 203-207. Google Scholar↗ CrossRef↗

[26] Kennedy, H. (1997). Learning Works: widening participation in further education, Digital Education Resource Archive, THE FURTHER EDUCATION FUNDING COUNCIL. (pp 1-123). Google Scholar↗

[27] Mynbayeva, A., & Anarbek, N. (2016). Informatization of education in Kazakhstan: New challenges and further development of scientific schools. *International Review of Management and Marketing*, *6*(3), 259-264. Google Scholar↗

[28] Klinger, C. M. (2010). Behaviourism, Cognitivism, Constructivism, or Connectivism? Tackling Mathematics Anxiety with'isms' for a Digital Age. *Proceedings Adults Learning Mathematics-16*,*16*(1),154-161. Google Scholar↗

[29] Three Domains of Learning – Cognitive, Affective, Psychomotor Retrieved from @https://thesecondprinciple.com/instructional-design/threedomainsoflearning/ on 08/07/22.

[30] Rusdi, J. F., Salam, S., Abu, N. A., Baktina, T. G., Hadiningrat, R. G., Sunaryo, B., ... & Hardi, R. (2019). *ICT research in Indonesia. SciTech Framework*, *1*(1), 1-23. Google Scholar↗

[31] Gertrude, K. (2015). Maximising the effects of collaborative learning through ICT. *Procedia-Social and Behavioural Sciences*, *176*(1), 1005-1011. Google Scholar↗ CrossRef↗

[32] Kean, A. C., Embi, M. A., & Yunus, M. M. (2012). Incorporating ICT Tools in an Active Engagement Strategy-Based Classroom to Promote Learning Awareness and Self-Monitoring. *International Education Studies*, *5*(4), 139-149. Google Scholar↗ CrossRef↗

[33] Divaharan, S., Lim, W. Y., & Tan, S. C. (2011). Walk the talk: Immersing pre-service teachers in the learning of ICT tools for knowledge creation. *Australasian Journal of Educational Technology*, *27*(8), 1304-1318. Google Scholar↗ CrossRef↗

[34] Chmielewska, K. (2022). Towards "Learnability". *Acta Polytechnica Hungarica*, *19*(1), 171-192. Google Scholar↗ CrossRef↗

[35] Kaware, S. S., & Sain, S. K. (2015). ICT application in education: an overview. *International Journal of Multidisciplinary Approach & Studies*, *2*(1), 25-32. Google Scholar↗

[36] Deryakulu, D., Buyukozturk, S., Karadeniz, S., & Olkun, S. (2008). Satisfying and frustrating aspects of ICT teaching: A comparison based on self-efficacy. *International Journal of Social, Management, Economics and Business Engineering*, *2*(10), 202-205. Google Scholar↗

[37] Garrido, M., Sullivan, J., & Gordon, A. (2010, December). Understanding the links between ICT skills training and employability: an analytical framework. In *Proceedings of the 4th ACM/IEEE International Conference on Information and Communication Technologies and Development* (pp. 1-10). Google Scholar↗ CrossRef↗

[38] Saad, M. S. M., Robani, A., Jano, Z., & Majid, I. A. (2013). Employers' perception on engineering, information and communication technology (ICT) students' employability skills. *Global Journal of Engineering Education*, *15*(1), 42-47. Google Scholar↗

[39] Arling, P., & Subramani, M. (2011). The effect of virtuality on individual network centrality and performance in on-going, distributed teams. *Journal of Internet and Enterprise Management*, *7*(4), 325-348. Google Scholar↗ CrossRef↗

[40] Mahmudah, F. N., Cahyono, S. M., Susanto, A., Suhendar, S., & Channa, K. (2021). Up-Skilling and Re-Skilling Teachers on Vocational High School with Industry Needs. *Journal of Vocational Education Studies*, *4*(2), 249-262. Google Scholar↗ CrossRef↗

[41] Twining, P., Broadie, R., Cook, D., Ford, K., Morris, D., Twiner, A., & Underwood, J. (2006). Educational change and ICT: an exploration of priorities 2 & 3 of the DfES eStrategy in schools and colleges. *oro.open.ac.uk*, November 2006,1-86. Google Scholar↗

[42] Kozma, R. B. (2008). ICT, education reform, and economic growth: a conceptual framework. *INTEL-White paper*, *2008*(4), 1-14. Google Scholar↗

[43] Van Wee, B., Geurs, K., & Chorus, C. (2013). Information, communication, travel behaviour and accessibility. *Journal of Transport and Land Use*, *6*(3), 1-16. Google Scholar↗ CrossRef↗

[44] Sobejana, N. (2016). Educational technology and academic performance of students in Basic English in selected higher education institutions in Davao del Sur. *International Journal of Logistics Research and Applications*, *1*(1), 1-13. Google Scholar↗

[45] Mohanty, R. R. (2011). ICT advantages and disadvantages. *ACADEMIA*, *2016*(3), 1-5. Google Scholar↗

[46] Muianga, X., Klomsri, T., Tedre, M., & Mutimucuio, I. (2018). From Teacher-Oriented to Student-Centred Learning: Developing an ICT-Supported Learning Approach at the Eduardo Mondlane University, Mozambique. *Turkish Online Journal of Educational Technology-TOJET*, *17*(2), 46-54. Google Scholar↗

[47] Asfar, N., & Zainuddin, Z. (2015). Secondary students' perceptions of information, communication and technology (ICT) use in promoting self-directed learning in Malaysia. *The Online Journal of Distance Education and E-Learning*, *3*(4), 67-82. Google Scholar↗

[48] Fitzgerald, R. N. (2004). ICT: Challenges for creative learning. *New Horizons in Education*, *50*(1), 16-23. Google Scholar↗

[49] Pinheiro, M. M., & Simões, D. (2012). Constructing knowledge: An experience of active and collaborative learning in ICT classrooms. *Procedia-Social and Behavioral Sciences*, *64*(1), 392-401. Google Scholar↗ CrossRef↗

[50] Das, K. (2019). The role and impact of ICT in improving the quality of education: An overview. *International Journal of Innovative Studies in Sociology and Humanities*, *4*(6), 97-103. Google Scholar↗

[51] Ali, S. N. (2012). *Malaysian polytechnic lecturers' teaching practices with ICT utilisation to promote higher-order thinking skills.* Iowa State University, Iowa, USA. pp 1-266. Google Scholar↗ CrossRef↗

[52] Ng'ambi, D., & Johnston, K. (2006). An ICT-mediated Constructivist Approach for increasing academic support and teaching critical thinking skills. *Journal of Educational Technology & Society*, *9*(3), 244-253. Google Scholar↗

[53] UGWU, N. P., & Nnaekwe, K. (2019). The concept and application of ICT to teaching/learning process. *International Research Journal of Mathematics, Engineering and IT*, *6*(2), 10-22. Google Scholar↗

[54] Oliver, R., Harper, B., & Wills, S. (2007). Describing ICT-based learning designs that promote quality learning outcomes. In *Rethinking pedagogy for a digital age* (pp. 84-100). Routledge. Google Scholar↗ CrossRef↗

[55] Suryawanshi, K., & Narkhede, S. (2015). Green ICT for sustainable development: A higher education perspective. *Procedia computer science*, *70*(1), 701-707. Google Scholar↗ CrossRef↗

[56] Tayebinik, M., & Puteh, M. (2012). Blended Learning or E-learning?. *International Magazine on Advances in Computer Science and Telecommunications (IMACST)*, *3*(1), 103-110. Google Scholar↗ CrossRef↗

[57] Arkorful, V., & Abaidoo, N. (2015). The role of e-learning, advantages and disadvantages of its adoption in higher education. *International journal of instructional technology and distance learning*, *12*(1), 29-42. Google Scholar↗

[58] Blayone, T. J., vanOostveen, R., Barber, W., DiGiuseppe, M., & Childs, E. (2017). Democratising digital learning: theorising the fully online learning community model. *International Journal of Educational Technology in Higher Education*, *14*(1), 1-16. Google Scholar↗ CrossRef↗

[59] Sulaiman, F., Atan, H., Idrus, R. M., & Dzakiria, H. (2004). Problem-based learning: A study of the web-based synchronous collaboration. *Malaysian Online Journal of Instructional Technology*, *1*(2), 58-66. Google Scholar↗

[60] Kabanda, G. (2008). Collaborative opportunities for ICTs development in a challenged African environment. *Journal of technology management & innovation*, *3*(3), 91-99. Google Scholar↗ CrossRef↗

[61] Forcheri, P., & Molfino, M. T. (2000). ICT as a tool for learning to learn. In *Communications and networking in education* (pp. 175-184). Springer, Boston, MA. CrossRef↗

[62] Ramankulov, S., Usembaeva, I., Berdi, D., Omarov, B., Baimukhanbetov, B., & Shektibayev, N. (2016). Formation of the Creativity of Students in the Context of the Education Informatization. *International Journal of Environmental and Science Education*, *11*(16), 9598-9613. Google Scholar↗

[63] Sapargaliyev, D., & Shulenbayeva, K. (2013). Informatization of Kazakhstani higher education. *Procedia-Social and Behavioural Sciences*, *83*(1), 468-472. Google Scholar↗ CrossRef↗

[64] Zhu, L. (2018). Innovative English teaching modes based on higher education Informatization. *Educational Sciences: Theory & Practice*, *18*(6), 3101-3106. Google Scholar↗ CrossRef↗

[65] Vodyanenko, G. R. (2014). Information and Cognitive Activities of a Student As a way to Interact with the New Information Reality. *Biosciences Biotechnology Research Asia*, *11*(3), 1731-1735. Google Scholar↗ CrossRef↗

[66] Tukshumskaya, A. V., Popova, T. N., & Tihanova, N. Y. (2020). Application of Modern Information Systems in the Framework of the Educational Course "Self-Determination and Professional Orientation of the Student's Personality". *ITM Web of Conferences, EDP Sciences*, 35(1), 1-10. Google Scholar↗ CrossRef↗

[67] Havryliuk, N. M. (2019). E-learning education as a means of professional self-realisation of students in US higher educational establishments. *Scientific Journal of the Drahomanov National Pedagogical University*, *67*(5), 48-51. Google Scholar↗

[68] Babenko, V., Perevozova, I., Mandych, O., Kvyatko, T., Maliy, O., & Mykolenko, I. (2019). World informatization in conditions of international globalisation: Factors of influence. *Global Journal of Environmental Science and Management*, *5*(1), 172-179. Google Scholar↗ CrossRef↗

[69] Zhang, X., He, W., & Gao, T. (2021, August). Construction Company Competitiveness Research on Informationization Policies. In *2021 4th International Conference on Information Management and Management Science* (pp. 24-30). Google Scholar↗ CrossRef↗

[70] Romansky, R. P. WEB-BASED EDUCATIONAL SYSTEM FOR REGISTRATION AND EXCHANGE OF DOCUMENTS. *Proceedings of the 9th International Symposium on Intelligent Systems (INTELS'2010), 9*(1), 321-326 Google Scholar↗

[71] Gaspar, D., Zovko, J., & Mabic, M. (2014). Education of Students of Economics for e-Society. In *Central European Conference on Information and Intelligent Systems* (p. 94). Faculty of Organization and Informatics Varazdin. Google Scholar↗

[72] Romansky, R. (2019). A Survey of Informatization and Privacy in the Digital Age and Basic Principles of the New Regulation. *International Journal on Information Technologies and Security*, *1*(11), 95-106. Google Scholar↗

[73] Spirakis, G., Spiraki, C., & Nikolopoulos, K. (2010). The impact of electronic government on democracy: e-democracy through e-participation. *Electronic Government, an International Journal*, *7*(1), 75-88. Google Scholar↗ CrossRef↗

[74] Kluver, R. (2005). The architecture of control: A Chinese strategy for e-governance. *Journal of Public Policy*, *25*(1), 75-97. Google Scholar↗ CrossRef↗

[75] Pluzhnikova, T. V., Krasnova, O. I., Tanianskaia, S. M., Tanianskaia, V. E., Kolenko, I. A., Rumyantseva, M. O., & Bezborodko, M. M. (2021). Informatization of health care on the example of a utility company. *Wiadomości Lekarskie, 74*(6), 1521-1523. Google Scholar↗ CrossRef↗

[76] Dalayeva, T. (2013). The e-learning trends of higher education in Kazakhstan. *Procedia-Social and Behavioural Sciences*, *93*(1), 1791-1794. Google Scholar↗ CrossRef↗

[77] Wang, X., & Wang, H. (2019). A study on sustaining corporate innovation with E-commerce in China. *Sustainability*, *11*(23), 1-16. Google Scholar↗ CrossRef↗

[78] Vătuiu, T., & Popeangă, V. (2007). THE INFORMATIZATION OF THE ROMANIAN BANKING SYSTEM IN THE CONTEXT OF ROMANIA'S INTEGRATION IN THE EU. *Annals of the University of Petrosani Economics*, *7*(1), 369-374. Google Scholar↗

[79] Ali, O. F., Gohneim, A., & Roubaie, A. A. (2014, October). Knowledge sharing culture in higher education institutions: critical literature review. In *European, Mediterranean & Middle Eastern Conference on Information Systems* (pp. 1-18). Google Scholar↗ CrossRef↗

[80] Bendermacher, G. W., De Grave, W. S., Wolfhagen, I. H., Dolmans, D. H., & oude Egbrink, M. G. (2020). Shaping a culture for continuous quality improvement in undergraduate medical education. *Academic Medicine*, *95*(12), 1913-1920. Google Scholar↗ CrossRef↗

[81] Purwana, D., & Suhud, U. (2017). Entrepreneurship education and taking/receiving & giving (TRG) motivations on entrepreneurial intention: Do vocational school students need an entrepreneurial motivator. *International Journal of Applied Business and Economic Research*, *15*(22), 349-363. Google Scholar↗

[82] Froebel, F. (1886). *The education of man* (pp 1-273). A. Lovell & Company, New York. Google Scholar↗ CrossRef↗

[83] Hanushek, E. A., & Woessmann, L. (2010), Education and Economic Growth. *International Encyclopedia of Education*, *2*(1), 245-252. Google Scholar↗ CrossRef↗

[84] Beecher, B., Streitwieser, B., & Zhou, J. (2020). Charting a new path toward economic prosperity: Comparing policies for higher education hubs in Hong Kong and South Korea. *Industry and Higher Education*, *34*(2), 80-90. Google Scholar↗ CrossRef↗

[85] Marginson, S. (2010). Higher education in the global knowledge economy. *Procedia-Social and Behavioural Sciences*, *2*(5), 6962-6980. Google Scholar↗ CrossRef↗

[86] Gopinath, R. (2020). Investigation of Relationship between Self-Actualization and Job Satisfaction among Academic Leaders in Tamil Nadu Universities. *International Journal of Advanced Science and Technology*, *29*(7), 4780 - 4789 Google Scholar↗

[87] Kivunja, C. (2015). Teaching students to learn and to work well with 21st century skills: Unpacking the career and life skills domain of the new learning paradigm. *International Journal of Higher Education*, *4*(1), 1-11. Google Scholar↗ CrossRef↗

[88] Stanley, K., Dixon, K., Warner, P., & Stanley, D. (2016). Twelve possible strategies for enhancing interprofessional socialisation in higher education: Findings from an interpretive phenomenological study. *Journal of Interprofessional Care*, *30*(4), 475-482. Google Scholar↗ CrossRef↗

[89] Amey, M. J., Eddy, P. L., & Ozaki, C. C. (2007). Demands for partnership and collaboration in higher education: A model. *New directions for community colleges*, *2007*(139), 5-14. Google Scholar↗ CrossRef↗

[90] John, S. P. (2015). The integration of information technology in higher education: A study of faculty's attitude towards IT adoption in the teaching process. *Contaduría y administración*, *60*(1), 230-252. Google Scholar↗ CrossRef↗

[91] Mittal, P. (2021). Skilling India: Vocational orientation to higher education. In *India Higher Education Report 2020* (pp. 207-218). Routledge India. Google Scholar↗ CrossRef↗

[92] Harvey, L. (2000). New realities: The relationship between higher education and employment. *Tertiary Education & Management*, *6*(1), 3-17. Google Scholar↗ CrossRef↗

[93] Yorke, M. (2016). The development and initial use of a survey of student 'belongingness', engagement and self-confidence in UK higher education. *Assessment & Evaluation in Higher Education*, *41*(1), 154-166. Google Scholar↗ CrossRef↗

[94] Brooks, R., & Everett, G. (2008). The impact of higher education on lifelong learning. *International Journal of Lifelong Education*, *27*(3), 239-254. Google Scholar↗ CrossRef↗

[95] Kumar, A. (2009). Personal, academic and career development in higher education: SOARing to success (pp 1-348). Routledge, Oxon, UK. Google Scholar↗ CrossRef↗

[96] Jacobs, B., & Van Der Ploeg, F. (2006). Guide to reform of higher education: a European perspective. *Economic Policy*, *21*(47), 536-592. Google Scholar↗ CrossRef↗

[97] Paulsen, M. B., & Smart, J. C. (2001). The finance of higher education (pp 1-435). Agathon Press,*New York*. Google Scholar↗

[98] Terry, L. (2011). International initiatives that facilitate global mobility in higher education. *Mich. St. L. Rev.*, *2011*(1), 305-356. Google Scholar↗

[99] Yakovleva, N. O., & Yakovlev, E. V. (2014). Interactive teaching methods in contemporary higher education. *Pacific Science Review*, *16*(2), 75-80. Google Scholar↗ CrossRef↗

[100] Steyn, G. M. (2004). Harnessing the power of knowledge in higher education.*Education*,*124*(4),615-631 Google Scholar↗

[101] Gupta, S. B., & Gupta, M. (2020). Technology and E-learning in higher education. *Technology*, *29*(4), 1320-1325. Google Scholar↗

[102] Wiley, David and Green, Cable. "Why Openness in Education?" Game Changers: Education and Information Technologies. Ed. Diana G. Oblinger. Educause Publications, https://library.educause.edu/resources/2012/5/chapter-6-why-openness-in-education. Google Scholar↗

[103] Peters, M. A., & Britez, R. G. (2019). Open education and education for openness (pp 1- 55). Sense Publishers, Rotterdam, Netherlands Google Scholar↗ CrossRef↗

[104] Oblinger, D. G., & Lombardi, M. M. (2008). *Opening up education: The collective advancement of education through open technology, open content, and open knowledge* (pp 1-400). The MIT Press Cambridge, London, England Google Scholar↗

[105] Pinfield, S., Wakeling, S., Bawden, D., & Robinson, L. (2020). *Open access in theory and practice: The theory-practice relationship and openness* (p. 256). Taylor & Francis. Google Scholar↗ CrossRef↗

[106] Mulhall, P. J., Smith, D. V., Hart, C. E., & Gunstone, R. F. (2017). Contemporary scientists discuss the need for openness and open-mindedness in science and society. *Research in Science Education*, *47*(5), 1151-1168. Google Scholar↗ CrossRef↗

[107] Wiley, D. (2010). Openness as Catalyst for an Educational Reformation. *EDUCAUSE Review*, *45*(4), 15-20. Google Scholar↗

[108] Sanders, J., Blundy, J., Donaldson, A., Brown, S., Ivison, R., Padgett, M., Padian, K., Rittinger, K., Rowe, K., Stace, A., Viding, E., Chambers, C., & Chaplain, M. (2017). Transparency and openness in science. *Royal Society Open Science*, *4*(1),1-3. Google Scholar↗ CrossRef↗

[109] Pénin*, J. (2013). Are you open? An investigation of the concept of openness for knowledge and innovation. *Revue économique*, *64*(1), 133-148.. Google Scholar↗ CrossRef↗

[110] Hug, T. (2017, October). Openness in education: Claims, concepts, and perspectives for higher education. *Seminar.net*, *13*(2), 72-87. Google Scholar↗ CrossRef↗

[111] Gil-Jaurena, I. (2013). Openness in higher education. *Open Praxis*, *5*(1), 3-5. Google Scholar↗ CrossRef↗

[112] Pretorius, H. W., Steyn, A. A., & Johnson, R. D. (2012). Pair Teaching of ICT in Higher Education: A Multi-Perspective Reflection. *Research in higher education journal*, *17*(1),1-12. Google Scholar↗

[113] Caruana, V. (2014). Re-thinking global citizenship in higher education: From cosmopolitanism and international mobility to cosmopolitanisation, resilience and resilient thinking. *Higher Education Quarterly*, *68*(1), 85-104. Google Scholar↗ CrossRef↗

[114] Dalsgaard, C. & Thestrup, K. (2015). Dimensions of Openness: Beyond the Course as an Open Format in Online Education. *International Review of Research in Open and Distributed Learning*, 16(6), 78–97. Google Scholar↗ CrossRef↗

[115] Hug, T. (2013). Key Concepts in Education: Critical Issues beyond Definition and Discursive Practices. *Seminar.net* , *9*(2), 43-58. Google Scholar↗ CrossRef↗

[116] Economides, A. A. & Perifanou, M. (2018). Dimensions of Openness in MOOCs & OERs. *EDULEARN2018 Proceedings, 10th International Conference on Education and New Learning Technologies, Palma Spain, IATED Digital library*, 3684-3693. Google Scholar↗ CrossRef↗

[117] Holyoke, L. B., Sturko, P. A., Wood, N. B., & Wu, L. J. (2012). Are academic departments perceived as learning organisations?. *Educational Management Administration & Leadership*, *40*(4), 436-448. Google Scholar↗ CrossRef↗

[118] Edwards, R. (2015). Knowledge infrastructures and the inscrutability of openness in education. *Learning, Media and Technology*, *40*(3), 251-264. Google Scholar↗ CrossRef↗

[119] Peter, S., & Deimann, M. (2013). On the role of openness in education: A historical reconstruction. *Open Praxis*, *5*(1), 7-14. Google Scholar↗ CrossRef↗

[120] Scanlon, E. (2012). Rethinking the scholar: Openness, digital technology and changing practices. *International public communication of science and technology conferenceBook of papers*, *18*(20), 307-310. Google Scholar↗

[121] Nascimbeni, F. & Burgos, D. (2016). In Search for the Open Educator: Proposal of a Definition and a Framework to Increase Openness Adoption Among University Educators. *International Review of Research in Open and Distributed Learning*, *17*(6), 1–17. Google Scholar↗ CrossRef↗

[122] Truan, N. & Dressel, D. (2022). Doing Open Science in a Research-Based Seminar: Students' Positioning Towards Openness in Higher Education. *International Review of Research in Open and Distributed Learning*, *23*(3), 153–170. Google Scholar↗ CrossRef↗

[123] Cronin, C. (2017). Openness and praxis: Exploring the use of open educational practices in higher education. *International Review of Research in Open and Distributed Learning: IRRODL*, *18*(5), 15-34. Google Scholar↗ CrossRef↗

[124] Wiley, D., & Hilton III, J. (2009). Openness, dynamic specialisation, and the disaggregated future of higher education. *International Review of Research in Open and Distributed Learning*, *10*(5), 1-16. Google Scholar↗ CrossRef↗

[125] Horwitz, R. A. (1979). Psychological effects of the "Open Classroom". *Review of Educational Research*, *49*(1), 71-85. Google Scholar CrossRef

[126] Aithal, P. S. (2016). Study on ABCD analysis technique for business models, business strategies, operating concepts & business systems. *International Journal in Management and Social Science*, *4*(1), 95-115. Google Scholar↗

[127] Aithal, P. S., Shailashree, V., & Kumar, P. M. (2015). A new ABCD technique to analyze business models & concepts. *International Journal of Management, IT and Engineering*, *5*(4), 409-423. Google Scholar↗

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