

Educational Dimensions of Industry 4.0: The Training of Career Counselors in ICT

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Abstract. The introduction of Information and Communication Technologies (ICT) in all professions and scientific fields has had a dramatic impact on their practice and methodology.

This study will focus on the educational dimensions of the 4th Industrial Revolution and the evaluation of a programme of training and education of career counsellors in the use of new technologies.

It is a fact that in current era, due to the significant developments and changes, the communication of a Counsellor with each «client» - patient through the Internet is considered necessary.

Two-way communication must be ensured and it is necessary for counsellors to have all the skills to use and exploit new technologies.

The 4th industrial revolution could be said to define the communication between man and intelligent machines. It is a huge field that is showing rapid progress and concerns the automation and exchange of data with the production process and its management in relation to citizens. It includes the domains, internet of things IoT, industrial internet of things IIoT, Cyber-physical systems CPS, Smart manufacturing, Smart factories, Cloud computing, Cognitive computing, Artificial Intelligence.

Keywords: *4th Industrial Revolution, Cognitive computing, Counselors Training, Systemic Modelling, ICT.*

1. Introduction

Cognitive computing enables us to extract useful information about complex data. It can give us solutions for possible scenarios and situations by analyzing the data by setting parameters, recognizing the requirements of specific tasks and understanding the data in the environment such as time, location, etc. (Singh et al., 2020)

This technology produces autonomous options, using advanced analytical capabilities to test processes and services.

By harnessing the power of cognitive computing, we can make great strides in consulting and the quality of the consultant-«client» relationship, creating approaches using it as a means of supporting the consultant to create effective performance at different levels of consulting in the age of the 4th industrial revolution.

Therefore, the creation of a training program that will provide the technological knowledge for teleconferencing in order to carry out Counselling at a distance is deemed necessary (Spanea & Tsergas, 2008).

According to the literature, we learn that counsellors have limited skills in using new technologies in the counselling process (Tsergas, 2007).

Thus, two categories are born. Advocates of technology mediated provision, who talk about how online environments empower clients, democratize counselling practice, allow for coaching and the creation of a therapeutic relationship to overcome the constraints of time and space, and so can offer distinct advantages not available in face-to-face counselling (Anthony et al., 2010; Goss & Anthony, 2009; Hooley, 2015).

On the other side, there is a significant number of counsellors who show strong resistance to the integration of ICTs (information and communication technologies), in the practice of career counselling, due to certain factors, such as age, education level, gender, lack of skills, lack of education and training or even the relevant technological equipment that may be necessary (Foon et al., 2020).

2. Scope and Methodology

The proposed study will investigate the perceptions, and difficulties of counsellors before and after training, in order to examine where their

education - training should be oriented as an alternative to face-to-face counselling (Paterson et al., 2019).

Other challenges identified are limited access to the Internet, digital illiteracy and quality of information, confidentiality and immediate response to urgent «client» needs. The implications of these are discussed as well as how the role of career counsellors can help improve counselling services for current and future use. (Zainudin et al., 2020).

New technologies help career counsellors to organize and deliver online interventions in the form of distance counselling such as individual and group career development sessions, decision making, career planning, skills cultivation, job search and others. (Gati & Asulin-Peretz, 2011; Mason et al., 2019).

Information and Communication Technologies (ICT) are also used in face-to-face counselling, such as the administration of psychological tests and their correction, and skills development. The training programme for counsellors in ICT will be based on the principles of person-centered and critical adult education, so that it can contribute to a holistic development of competences, knowledge and attitudes and other skills (such as metacognitive, and intrapersonal, psycho-emotional, interpersonal), as well as familiarization with experiential training techniques (Zoniou, 2016; Gkatzouna, 2018; Dimitriadou, 2020; Hoidn & Klemenčič, 2020).

Equipped with the necessary tools and skills, counsellors will therefore be able to learn, discover and adapt to new technologies to keep pace with our times and their needs.

At the end of the programme, the achievement of the objectives of the programme and its effectiveness will be evaluated.

In this research, the methodology we will follow includes as a Sample the participants of the program to train counsellors in the use of new technologies in counselling practice. It is estimated that the approximate sample size will be about thirty (30) persons.

Participants will be selected after posting an expression of interest on the ELESYP (Hellenic Society for Counseling and Guidance) website for participation in a training program. The programme will be addressed to people working as career guidance and career counsellors, psychologists, social workers, and in general to graduates and postgraduates of relevant specializations practicing counselling.

So here in our case we are dealing with criterion sampling. The researcher using this strategy selects the cases that will constitute his sample according to some criterion, which is determined according to the objectives of his research (Iosifidis, 2008).

For the data collection method, we have thought of organizing it into three parts:

1. With a questionnaire (survey), at the beginning of the training with the aim of collecting data from the participants, based on which we will investigate the relationship between age and the level of computer knowledge, their self-assessment, their ability to adapt to new situations, their way of learning as well as their ability to follow the developments. It will also explore their needs and difficulties in using new technologies. So that on the basis of this information the training programme for counsellors can be developed;
2. then there will be a Selective research approach with a case study;
3. and at the end there will be interviews with those who have completed the programme, in order to provide feedback and evaluation of our programme.

The data analysis method we will follow is:

- Quantitative analysis of the data collected from the administration of the questionnaires. Their coding and data entry will be done in a statistical program such as SPSS and this will be done to find trends and slopes of the counsellors with the programs.
- The Qualitative method, which will be used to analyze the content of the interviews with the consultants who have attended the training program.

As we can see so far, we have a complex environment with multiple factors and for this we will need the help of Systemic Modelling which aims to discover and describe the components of the complex systems under study, as well as their mutual relationships and interactions. It supports the analysis by providing informative and understandable representations of the systems under study.

It is therefore a large-scale structured design tool for describing problems in a hierarchical way (Papakitsos, 2013; Pandey, 2016).

OMAS-III is our technique, our system modelling tool that will give us a comprehensive and flexible way to describe the semantics of the system (Papakitsos, 2013).

Consequently, it is a holistic approach to consulting and can refer to humans and machines (machine learning).

According to OMAS-III, (Papakitsos, 2010, 2011, 2013) the definition of a system consists of six elements identified by answering the seven questions of journalists, in a natural linguistic way, i.e., using the same words that people use every day to ask about anything they want to know.

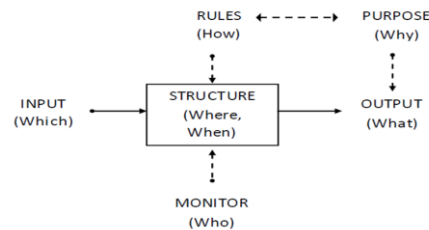


Figure 1: The basic OMAS flowchart (Adapted from: Papakitsos, 2013).

- Why does it exist and work, what is the scope (Purpose/Why?) of the system, which in our case is the training of counsellors in distance counselling.

- What results and what conclusions does it give? The Outputs (= Output/What?) include feedback. The Output of the system includes the results of its operation, in terms of measurable (the quantitative result) and/or describable (the qualitative result) ones.

- How many resources are needed; here we describe the Inputs (= Input/Which?), which includes feedback. So, inputs consist of resources, which can be the equipment/technology, media, raw materials, hardware and software, human resources, know-how and information, capital, energy, infrastructure, required for the output. The input therefore provides the system with the necessary elements for its operation.

- How does it work and what are the Rules and Conditions (= Rules/How?). Rules consist of relevant legislation, professional ethics, and by-laws that have a regulatory effect on the system.

- Who monitors or guides its operation? (Oversight of the system = Monitor/Who?). Monitoring shall be carried out by individuals or groups of individuals who have the primary roles of administration, management, supervision or critical operation of the System Participants.

- Where it works; these are the (spatial elements of the System Structure = Structure / Where?). The space where our educational process takes place is a constituent part of the learning process. In a structured environment, the space influences the behaviour of counsellors-“clients” and the learning process.

- When does it work? These are the temporal elements of the Structure of the system (= Structure / When?) (Papakitsos 2013).

The software that will serve us for the way of teaching consultants in distance education is Moodle: a learning management system used by the University of West Attica is one of the “software systems based on Internet technologies in order to promote open and distance education in a user-friendly, cost-effective and pedagogically sound way” (Avgeriou et al., 2005: 131).

Moodle offers users various tools and the ability to communicate so that instructors and learners can collaborate and interact, as it is designed based on social constructivist learning theory (Bimrose & McMahan, 2016). It can even contribute to the development of personality and intelligence, as according to his theory (Gardner, 1983) intelligence develops when an individual interacts with others in a particular social context.

3. Conclusion

Our research aims to fill the gap that exists in terms of counsellors' familiarity with new forms of technology and communication and distance counselling. It is based on the increasing ability of internet users to share information and collaborate in real time via the internet. This programme will help to enable counsellors to interact with counsellors, taking full advantage of the potential of the Internet.

The evaluation of the results of the project will contribute to the experiential, communicative training of counsellors based on reflection and transformational theoretical perspectives. It will offer an upgraded effective way of offering counselling through Information and Communication Technologies. It focuses on cultivating the skills so that experiential training in ICTs can help counsellors to develop themselves to their own advantage and to broaden and enrich their counselling practice.

References

- Avgeriou et al. (2005). [Αυγερίου, Π., Παπασαλούρος, Α., Ρετάλης Σ., Ψαρομηλίγκος, Ι. (2005). «Συστήματα διαχείρισης της μάθησης», στο: Σ. Ρετάλης (επιμ.) Οι προηγμένες τεχνολογίες διαδικτύου στην υπηρεσία της μάθησης, Αθήνα: Εκδόσεις Καστανιώτη, σ. 134-151].

- Anthony, K. E., & Goss, S. P. (2009). *Guidelines for online counselling and psychotherapy, including guidelines for online supervision* (3rd ed.). Lutterworth: BACP
- Anthony, K. E., Nagel, D. M., & Goss, S. P. (Eds.). (2010). *The use of technology in mental health: Applications, ethics and practice*. NY: CC Thomas.
- Bimrose, J., McMahon, M. (2016). *Constructivism in online career counseling. Career Counselling: Constructivist approaches*. Routledge.
- Mason, E. C. M., Griffith, C., Belser, T. C. (2019). *School Counselors' Use of Technology for Program Management*. 22, (1).
- Gkatzouna (2018). [Γκάτζουνα, Ε., (2018). Κίνητρα συμμετοχής και εμπόδια στην εκπαίδευση ενηλίκων. Η γνώση των νέων τεχνολογιών και η ανάδειξή τους σε σημαντικό παράγοντα ως προς την επιμόρφωση των εκπαιδευόμενων. Διπλωματική Εργασία. Προγράμματος Μεταπτυχιακών Σπουδών του Τ.Ε.Ι. Δυτικής Ελλάδας «Διοίκηση Εκπαίδευσης»].
- Dimitriadou (2020). [Δημητριάδου, Ε. (2020). Βιωματική μάθηση στην εκπαίδευση ενηλίκων. Οι μορφές διδασκαλίας και η αξιοποίηση των συμμετοχικών τεχνικών από τους εκπαιδευτές ενηλίκων στον τομέα του Τουρισμού στην Ελλάδα. Πρόγραμμα Μεταπτυχιακών Σπουδών Δια Βίου Μάθηση και Ειδική Αγωγή].
- Foon, L. W., Zainudin, Z. N., Yusop, Y. M., & Wan Othman, W. N. (2020). E-counselling: The intention, motivation and deterrent among school counsellors. *Universal Journal of Educational Research*, 8(3C), 44-51.
- Gat,i I., Asulin-Peretz, L. (2011). Internet-Based Self-Help Career Assessments and Interventions: Challenges and Implications for Evidence-Based Career Counseling. *Journal of Career Assessment* 19(3):259-273.
- Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligences*. New York: Basic Books.
- Hoidn, S., Klemenčič, M. (2020). *The Routledge International Handbook of Student-Centered Learning and Teaching in Higher Education*. Routledge International Handbooks of Education Routledge.
- Hooley, T. (2015). How the internet changed career: framing the relationship between career development and one line technologies. *Journal of the National Institute for Career Education and Counselling*, 29(1), 3-12(10) October 2012.
- Iosifidis (2008). [Ιωσηφίδης, Θ. (2008). Ποιοτικές μέθοδοι έρευνας στις κοινωνικές επιστήμες. Αθήνα: Κριτική].
- Singh, K. K., Singh A., Cengiz K. & Dac-Nhuong Le (2020) *Machine Learning and Cognitive Computing for Mobile Communications and Wireless Networks*. Scrivener Publishing LLC Wiley

- Pandey, K.N., (2016). Paradigms of Knowledge Management, Studies in Systems, Decision and Control. Springer India
- Paterson, S. M., Laajala, T., & Lehtelä, P. L. (2019). Counsellor students' conceptions of online counselling in Scotland and Finland. *British Journal of Guidance & Counselling*, 47(3), 292-303.
- Papakitsos, E. (2010). Organizational Method of Analysing Systems (in Greek). Diagrammatical technique of Systemic Theory along with application examples. PDSA 626: E. K. Thessalou, TRN 062079143, Athens.
- Papakitsos, E. (2011). Basic meanings of Linguistic Engineering (in Greek). Course Manual: "Technoglossia VI" MSc Programme in Linguistic Engineering. University of Athens, Faculty of Philology - National Technical University of Athens, School of Electrical & Computer Engineering. PDSA 673: E. K. Thessalou, TRN 062079143, Athens.
- Papakitsos, E. (2013). The Systemic Modeling via Military Practice at the Service of any Operational Planning. *International Journal of Academic Research in Business and Social Sciences* 3(9), September 2013,
- Spaneá & Tsergas (2008). [Σπανέα, Σ., Τσέργας, Ν. (2008). Συμβουλευτική Σταδιοδρομίας Μέσω Διαδικτύου Ζητήματα Μεθοδολογίας και Εφαρμογής. Επιθεώρηση Συμβουλευτικής – Προσανατολισμού, τ. 82-83, Μάρτιος-Ιούνιος, σσ. 237-243].
- Tsergas (2007). [Τσέργας, Ν. (2007). Η Συμβουλευτική Μέσω Διαδικτύου. Επιθεώρηση Συμβουλευτικής – Προσανατολισμού, τ. 80-81, Οκτώβριος-Δεκέμβριος, σσ. 256-266].
- Zainudin, Z. N., Hassan, S. A., Talib, M. A., Aniza, N., Ahmad, Y. M. Y., & Asri, A. S. (2020). Technology-Assisted Career Counselling: Application, Advantages and Challenges as Career Counselling Services and Resources. *Sciences*, 10(11), 67-93.
- Zoniou (2016). [Ζόνιου, Χ. (2016). Η συμβολή του θεάτρου του καταπιεσμένου και άλλων δραματικών τεχνικών στην ανάπτυξη της διαπολιτισμικής ικανότητας των εκπαιδευτικών. Διδακτορική Διατριβή Πανεπιστήμιο Θεσσαλίας Σχολή Ανθρωπιστικών και Κοινωνικών Επιστημών Παιδαγωγικό Τμήμα Προσχολικής Εκπαίδευσης].

Web Sites

<https://www.techradar.com/uk/best/best-online-learning-platforms>

<https://moodle.org/?lang=el>

<http://ec.europa.eu/progress> 2013 New technologies for career guidance and mobility Handbook for practitioners Siena. This project is supported by the European Union's Programme for Employment and Social Solidarity - PROGRESS (2007- 2013)

<https://tech.ed.gov/>.

<http://www.informalscience.org>