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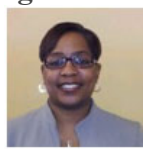
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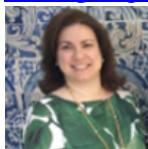
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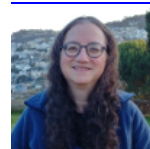
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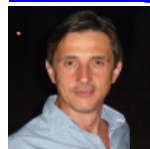
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We would like to thank all the Program Committee (PC) members for their outstanding scholarly reviews and dedicated feedback to the authors!

## **Knowledge in the service of information privacy and security behaviors**

[Keynote]

**France Bélanger**, Virginia Tech, USA, [belanger@vt.edu](mailto:belanger@vt.edu)

### **Abstract**

*Individuals continue to be the weakest link in information security and privacy. Explanations for the lack of proactive information protection behaviors have included (among others) the extent of efforts versus the expected benefits (i.e., a calculus of behavior), lack of caring, beliefs that individuals cannot do anything that would be effective (i.e. learned helplessness, lack of awareness of the issues, and lack of knowledge). In this presentation, I focus on actual knowledge as a rarely studied construct that could effectively enhance information security and privacy behaviors both within organizations and in the larger society. Using examples of findings in several recent studies, I demonstrated the role of knowledge and compare it to the role of perceived abilities (self-efficacy). The presentation then moves into a call for research on knowledge as a core concept to foster information protective behaviors in individuals and to explain the role that cybersecurity and privacy governance can have in doing this.*

## **Knowledge sharing versus non-knowledge sharing**

[Keynote]

**Mírian Oliveira**, Pontifícia Universidade Católica do Rio Grande do Sul, Brazil,  
[miriano@pucrs.br](mailto:miriano@pucrs.br)

### **Abstract**

*Knowledge sharing (KS) is the process whereby individuals exchange their knowledge. Knowledge sharing has two processes: (1) knowledge donation - intellectual capital is communicated to others; and (2) knowledge collection - intellectual capital of another individual is consulted. Several studies have sought to identify the antecedents of knowledge sharing in different contexts. However, few companies have been successful in sharing knowledge (intra-organizational and inter-organizational). On the other hand, few studies have investigated non-knowledge sharing, when individuals intentionally hide knowledge. It may be the case that some antecedents of knowledge hiding or knowledge hoarding may discourage knowledge sharing. Further research into knowledge hiding and hoarding is needed, because there is a gap in the literature regarding the antecedents of non-knowledge sharing and knowledge sharing. We will discuss the relationship between these concepts, and we will conclude with an agenda for future research related to knowledge hiding, knowledge hoarding and knowledge sharing (donation and collection).*

## **Knowledge sharing of combat experiences: Limitations of storytelling**

[Keynote]

**Brian Buckles**, National Defense University, USA, [brian.buckles@ndu.edu](mailto:brian.buckles@ndu.edu)

### **Abstract**

*Critical to the success of military operations, is the transfer of combat knowledge from one generation of service member to the next. To facilitate this knowledge sharing process, militaries use multiple formal means to prepare soldiers for future combat operations such as realistic training, combat simulations, wargames, lessons learned forums, and detailed after action reports. Other less formal methods of knowledge sharing include reading programs, discussion forums, and storytelling. Storytelling has the advantage of personalizing the impact of combat experiences in a smaller group setting in which knowledge can be shared effectively. While effective, this presentation will examine the limitations of storytelling as a means to share combat experiences and knowledge.*

## **Knowledge as vital part of the project management in remote project teams**

*[Workshops]*

**Celina Sołek-Borowska**, SGH Warsaw School of Economics, Poland, [csolek@sgh.waw.pl](mailto:csolek@sgh.waw.pl)

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### **Abstract**

**Workshop 1: “Home Desk Picture”** *Nowadays each of us is working from home due to the world COVID19 Pandemic. Our home desk became our working office. Conference delegates were invited to take a picture of their desk when they think they were the most productive. The participants sent two (2) pictures of their home desk about one week before the conference to the workshop facilitators. During the conference workshop, the workshop facilitators presented the most interesting ones and ask all participants to vote who they think was the best desk in terms of productivity? Participants’ discussion was then facilitated on what is important in their daily work from home.*

**Workshop 2: “Blind Origami”** *The delegate participants were split randomly into several smaller groups of five people in each. Then they were asked to find a sheet of letter or A4 size paper for each, video cameras were asked to be closed, and a team leader was appointed by the workshop facilitators. Each team leader was provided with the instructions of the origami to produce, and their role was to provide these instructions via voice only to the rest of the team. The team that was able to produce the most accurate origami by all team members was recognized as a winner. The purpose of this activity was to highlight the importance of listening and asking for feedback when participants are working in remote location and they have to depend on team work.*

## **KM pandemic views**

*[Social Activity]*

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**Shonda Brown**, Middle Georgia State University, USA, [shonda.brown@mga.edu](mailto:shonda.brown@mga.edu)

### **Abstract**

*Given everyone is dealing with the pandemic at home, this social activity was set as a fun one to share some pictures on delegates view of the Pandemic using the following themes;*

- 1. A view from my window*
- 2. You and/or your family's face mask look*
- 3. You and/or your family doing sport at home*
- 4. Schooling from home*

*Delegates were asked to interpret the theme in any way they see fit. When taking photos, delegates were asked to not endanger themselves or others, to take unnecessary risks, or infringe any laws. Delegates were asked to include the title of theme in the subject line of their email message, add their name as well as a caption such as who, what, where, and when. They were able to enter up to three images. Pictures were sent to the Social Activity facilitators via e-mail prior to the conference. The facilitators integrated them into showcase presentations that displayed during the social breaks.*

## **Replay-peak attention chart: A performance measure for improving online video lecture design**

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### **Abstract**

*The ability to replay selected video segments is a major advantage of online video lectures. Replay is a learning instance that reflects active engagement. This paper develops the 'replay-peak attention chart' as a new performance measure of learner's attention, based on the control chart concept, which is used for Statistical Process Control (SPC) in operations management. This study follows the design science research paradigm and employs a mixed methods methodology, combining quantitative learning analytics with qualitative analysis of notable segment replay instances by viewers of online video lectures. An analysis of a successful Massive Open Online Course (MOOC), titled "Negotiation Management" provides a proof-of-concept for the replay-peak attention chart, as a visual heuristic tool for identifying notable learning instances. The MOOC includes Educational Entertainment (edutainment) in the form of negotiation simulations which are presented as sitcoms and are meant to increase learner engagement. From an attention economy perspective, the replay-peak attention chart may help instructors and designers to focus their limited attention resources on segments of online video lecture sessions that may require pedagogical interventions. This paper critically discusses the replay-peak attention chart conceptualization and its initial proof-of-concept. It suggests future research directions for substantiating the replay-peak attention chart and investigating the effect of edutainment on online learning. The replay-peak attention chart is a dynamic descriptive performance measure, which has a promising potential to improve the design of effective online video lectures as an e-learning resource.*

**Keywords:** Replay-peak attention chart, online video lectures, attention economy, learning analytics, learning design, "Negotiation Management" MOOC, edutainment.

## **Personal data protection and academia: GDPR issues and multi-modal data-collections "in the wild"**

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### **Abstract**

*The European Union (EU) General Data Protection Regulations (GDPR) has a direct impact on research activities, as it raises the awareness of personal rights not only among the scientists but also among the data-subjects scientists process information from. This paper presents the dilemma related to the privacy of audio and video data, compliance with the EU GDPR, and techniques to anonymize and pseudonymize such data. We further discuss issues of "in the wild" personal data collection by focusing on multi-modal collections, mainly of audio, video via these channels. Throughout this paper we define relevant core issues and highlight two challenges of "in the wild" data collection: Internet crawling and public data collecting. In the last section, some exemplary use cases are demonstrating the raised issues, illuminating how GDPR affects the collection of publicly available data; how privacy concerns influence participant behavior, and which de-anonymization levels can be reached with what kind of data. The key point we present is that the identity of the participants is revealed in the voice or video signal, while the latter is at the same time the object of the research. One implication is that the research community has to actively disconnect the data from the personal information on the participants. Hence the importance of a process of anonymity or omission of data for research activity. This entail the development of an infrastructure for data access control to enable data sharing among researchers.*

**Keywords:** General Data Protection Regulations (GDPR), data collection, interaction resources, personal data, academia, "in the wild".

# **The effect of image resolution in the human presence detection: A case study on real-world image data**

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## **Abstract**

*The automated operation of robots and flying drones is coupled to high security requirements with respect to humans and environment. Sometimes, persons have to be detected from a long distance or high altitude to allow the autonomous system an adequate and timely response. State-of-the-art Convolutional Neural Networks (CNNs) enable high object detection rates for different image data but only within their respective training, validation and test datasets. Recent studies show the limited generalization ability of CNNs for unknown data, even with merely small image changes. A typical source of such problems is the varying resolution of input images and the inevitable scaling of them to match the input-layer size of the network model. While modern cameras are able to capture high-resolution images of humans also from a longer distance, the practical input-layer sizes of networks are comparably small. Hence, we investigate the reliability of a network architecture for human detection with respect to such input-scaling effects. The popular VisDrone dataset with its varying image resolution and many relatively small depictions of humans is surveyed as well as the high-resolution AgriDrone image data from an agricultural context. Our results show that the object detection rate depends on the image scaling factor as well as on the relative size of persons. An enlarged input-layer size of the network can only partially contribute to counteract the observed effects. In addition, the detection algorithm becomes computationally more expensive by the increased effort.*

**Keywords:** Human detection, drone imagery, long-distance capturing, image scaling, deep learning.

## **Key criteria of ERP/CRM systems selection in SMEs in Poland**

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### **Abstract**

*The purpose of this paper was to conduct an investigation on criteria of Enterprise Resources Planning (ERP)/Customer Relations Management (CRM) systems selection used by Small and Medium-sized Enterprises (SMEs) in Poland. The main goal was to define the key selection criteria that should be used to ensure the optimal decision of the purchase of the system. The reason for the choice of this research question was that SMEs have to constantly struggle with lack of resources. The choice of the right ERP and/or CRM system can significantly improve their operational efficiency and competitiveness. A synthetic review of the literature on the selection criteria of ERP and/or CRM systems was conducted and presented. Opinions of 83 respondents with work experience in SMEs that had undergone an implementation of an ERP and/or CRM system or vendors of ERP and/or CRM systems for SMEs in Poland were collected in the form of Google Form surveys and analyzed with the use of Spearman's rank order correlation. The main conclusion of this study is that two most important selection criteria are: system functionality and the ability to ensure data security. The study results may be of practical use for SMEs' decision-makers for the selection of the CRM and/or ERP class system. A further and more comprehensive research into the topic is recommended.*

**Keywords:** Customer Relations Management (CRM), Enterprise Resources Planning (ERP), Information and Communication Technology (ICT), Small and Medium-sized Enterprises (SMEs), Poland.

## **The invisible hole of cybersecurity insurance services**

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### **Abstract**

*This study examines the cybersecurity insurance market in the United States (U.S.) in order to reveal if an “invisible hole” of services and information exists in this market. This is performed by mapping the cybersecurity insurance services, offered by insurance companies, to cope with cybersecurity risks, and finding in which way these services are exposed, visible and comprehensive, in the insurance companies' websites. The research questions examined the extent cybersecurity insurance services offered by the main U.S. insurance companies; the visibility of such services on their websites; and the types of services offered. The sample included 44 insurance companies based upon nine lists of the top U.S. insurance companies. The findings present that most companies (68%) offer cybersecurity insurance services, while only a few (26.92%) expose such information in a visible way. Moreover, on the one hand, the insurance companies use general terms for services, which may be blur and ambiguous, while on the other hand, there is a widespread of specific services, most of them (81%) provided only by few companies. These findings may derive due to insufficient understanding of cybersecurity insurance clients' needs and may reflect the lack of maturity of the cybersecurity insurance market, as matured marketplaces are mostly more standardized. This study demonstrates that there is a long way to advance until the insurance market for cybersecurity risks will be mature, customers (businesses and organizations) will understand the needs for such insurance, and insurance companies will develop and offer relevant insurance services.*

**Keywords:** Cybersecurity, insurance, cybersecurity insurance, cyber insurance, cyber coverage, information security, cybersecurity policy.

# **Knowledge-based systems for the Configure Price Quote (CPQ) process – A case study in the IT solution business**

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## **Abstract**

*Software systems for the Configure Price Quote (CPQ) process of complex product portfolios have emerged in the sales function of companies recently. A flexible quote of complex products, in particular for a business-to-business (B2B) customer requires a wide variability of product features and configurations, along with the ability to deliver competitive quotes in short time. The CPQ system aims to reduce the process time, to increase the process quality by integrating information and data stored in several enterprise systems with codified explicit and implicit knowledge from individuals. As in most of the knowledge management systems, the openness of the knowledge holders to share and codify their individual knowledge is a critical success factor.*

*In this case study, we look at the CPQ system implementation of a multinational Information Technology (IT) solution provider from a process perspective and with regard to both the technical and organizational challenges in a holistic approach. The article starts with an introduction to CPQ systems based on works from the Knowledge Management (KM) domain. After outlining our research methodology, we present the case together with a generalization of the CPQ implementation process. Our findings from the investigated scenario indicate positive influence of 1) the internal promotion of CPQ systems as technology innovation for motivating expert knowledge holders to collaborate; 2) an active preparation of the organizational environment for the upcoming changes; and 3) a hybrid agile implementation process.*

**Keywords:** Product configurator, sales configurator, CPQ system, hybrid agile, implementation process.

# **Digital influencers: An exploratory study of influencer marketing campaign process on instagram**

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## **Abstract**

*The evolution of the digital age and the rise of social networking sites brought changes to the consumer behavior. This transformation has led to an increasing number of opportunities and challenges. The increasing importance of digital influencers has been acknowledged by both practitioners and academics. However, due to its contemporaneity, the academic literature regarding this subject faces some limitations. Thus, the present study explored the perceptions of the marketing professionals towards digital influencers and influencer marketing campaigns on Instagram in the light of existing literature as well as to identify the most contemporary issues. This research followed a qualitative approach with a non-probabilistic convenience sampling. To achieve the objective of this study, semi-structured interviews were conducted with the professionals of the beauty sector, who have already contributed to influencer marketing campaigns. The results highlight the importance of digital influencers and the need for their creative freedom, authenticity and credibility. The findings display some of the difficulties the professionals undertake as it comes to measuring return on investment, managing rewards and differentiation of influencer campaigns. The main value of this study is that it documents all stages of the influencer marketing process as well as highlights the challenges and success factors of an influencer campaign.*

**Keywords:** Digital influencers, influencer marketing, influencer marketing campaign, beauty sector.

## **The competencies needed for digital transformation**

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### **Abstract**

*Due to advanced technologies, companies currently face massive changes in their work. The ability to connect with and to satisfy their customers through software-based experiences is even more important. This study contributes to the literature by helping companies rethink their strategies on the development of competencies to respond to the challenges of the current digital transformation. It further contributes by identifying the digital competencies, which are important in the companies' workplace environment of today. This study used a panel of 16 professionals to create an ordering rank according to the degree of importance of digital competencies. This ranking provides an updated overview of the challenge from the gap in digital competencies that has resulted from the digital transformation. We used the Delphi method to divide this process into two phases with two rounds. According to the results, the most important digital competencies are related with data analysis, use, and collaboration through digital technologies.*

**Keywords:** Digital transformation, talent gap, digital competencies, Delphi method.

# Using knowledge exchange between prosumers and enterprises to implement circular economy activities in businesses

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## Abstract

*The prosumer engagement conceptual model was considered in light of the Process Classification Framework as well as how results from Poland and United Kingdom (UK) survey data informed design of the combined prosumer engagement and knowledge exchange conceptual model. The desk literature method was used to review the papers in answering the research propositions. The revised model contains the constructs for supporting prosumer engagement to include sustainability and describes the flow of knowledge sharing and knowledge exchange. Knowledge exchange is the method used to capture and improve enterprise analysis of prosumer knowledge sharing. The sustainability construct includes circular economy philosophy where enterprises evaluate their product and service designs in terms of process stages. The findings confirm the need for increased prosumer engagement as enterprises strive to adopt ways of limiting negative impacts on the environment and improving ethical and responsible business practices. The circular economy is having an impact on all industrial sectors requiring them to evaluate and rethink their processes. The enhancement of the role of prosumers in the circular economy could act as a positive driver for business process changes and aid enterprises in meeting carbon neutral plans. The main contribution of this paper is to offer a novel concept that explains how enterprises can capture and translate prosumer knowledge to inform business strategy within a circular economy setting.*

**Keywords:** Consumer knowledge, prosumer, knowledge sharing, circular economy.

# **Learning soft skills in the digital age: Challenges and insights from development and teaching 'negotiation management' MOOC**

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## **Abstract**

*Massive Open Online Courses (MOOCs), growing in number in recent years, occupy a significant place as an open educational resource, and provide insights into the development process as well as offer an innovative educational experience. This reflective article examines insights gathered during the development and running of two sessions of my Negotiation Management MOOC. The article reviews the development process of the course which is built as a series of situations that simulate real-life moments. The episodes are displayed in a mini case format, based on the principle of sitcoms and the 'edutainment' (educational entertainment) approach. The video clips combine the simulations with the lecturer's analysis, using theories, models, and concepts from their course and training. This is intended to produce a strong emotional engagement in the course contents and to motivate the students to continue learning. The developmental stages raised pedagogical questions around content and training, relating to length of the video clips, Interactive learning, and Communication. Those stages were presented in the first part of this article. In addition, the article offers in its second part, insights from our two target audiences as reported in the student experience reports. The surveys refer to the teaching method, the length of the videos, interactive learning and the unique integration of lecturers and actors in the videos. The student surveys combined from the lecturer's perspective give us insights in relation to course development and teaching in the Edutainment MOOC approach.*

**Keywords:** "Negotiation management" Massive Open Online Course (MOOC), educational entertainment (edutainment), videos in MOOC, engagement, flipped classroom.

## **Cybersecurity capacity building of human capital in the African region**

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### **Abstract**

*Capacity building human capital can be described as the experience, knowledge, skillsets, and intangible assets, that add economic value to individuals and the organizations they work for. With the ever-growing gap in cybersecurity skillsets, it is essential to have a shared understanding of the necessary skills and what those skills represent in the form of human capital to not only individuals, but also the organizations they work for, and regions they work in. As nations in Africa continue to acquire evolving technologies, the pace in which these technologies are adopted outnumbers the rate in which the skills to protect these technologies are captured. In this study, we identify the development and value of cybersecurity human capital in the African region as well as specific steps necessary to develop cybersecurity skills into cybersecurity human capital, beside the many challenges faced by Sub-Saharan African nations. An overview of the programs developed by the United States Department of State's Office of the Coordinator for Cyber Issues is provided across three case studies.*

**Keywords:** Capacity building, cybersecurity, cyber-colonization, Knowledge transfer, skills building, risk, threat.

## **How to train for making and tinkering in formal education? Professional development of code and robotics teachers through MOOC to promote self-regulated learning**

*[Complete Research]*

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### **Extended Abstract**

The Israeli education system recently introduced a new code and robotics curriculum that uses open visual programming platforms to teach intuitive coding and building 3D programming artifacts. Behind the program lies the rationale of the Constructionist learning approach whereby we learn effectively by designing tangible outcomes. Beyond programming per se, the code and robotics curriculum develops students' computational thinking, which enables problem solving through abstraction, inclusion, component decomposition, error detection and correction processes (Lye & Koh, 2014). Teachers of code and robotics need to constantly update and learn throughout their professional lives. While the literature on this topic focuses on learners or learning processes, examining teacher training for such a profession awaits its researchers. This study examines professional training processes for code and robotics teachers in formal education. The training was conducted through a MOOC and required self-regulated learning skills. In order to change teaching-learning-assessment processes, foster independent learning and encourage *tinkering* among their students, teachers must experience self-directed learning themselves during their training. This study was conducted within the qualitative paradigm. The study examines reflections of 84 code and robotics teachers describing their professional training through MOOCs and conducts semi-structured interviews with 15 of them one year after completing the course. Reflection analysis focuses on the teacher's role and the learner's insights on the pedagogical design that encourages tinkering. The interviews focus on the actual pedagogical processes that the teachers carry out in their classroom. Preliminary findings indicate an increase of self-regulated learning during professional training. According to the teachers, self-directed learning through MOOC provides an important example of the learner-centered pedagogy. This experience raises motivation and enjoyment, but it also requires taking responsibility for the learning process and opens up to peer learning and assessment. The study will provide theoretical and practical insights into the contribution of self-regulated learning during training to encourage self-regulated learning in classrooms.

**Keywords:** Making, tinkering, teacher professional development, self-regulated learning, code and robotics, visual programming, pedagogical design

#### **Reference:**

Lye, S. Y., & Koh, J. H. L. (2014). Review on teaching and learning of computational thinking through programming: What is next for K-12? *Computers in Human Behavior*, 41, 51-61.

## **Collaborative learning between schools in order to promote sustainability of digital innovation within school culture**

*[Complete Research]*

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### **Extended Abstract**

In order to prepare students to function successfully in the knowledge society, one of the educational system's goals is to develop students' ability in interaction, collaboration and work in virtual teams. Collaborative learning (CL) shifts the essence from individual efforts to group work, from independent to community learning in which learners complete together shared tasks or create group outcomes (Laal et al., 2013). In such an approach, learners can be active, conduct dialogue with peers, exchange thoughts and insights, ask questions and become critical thinkers (Blau et al., 2020). This study investigated a district initiative of innovative inter-organizational online CL projects in elementary (413; 80/5%) and middle schools. The research questions were: 1) How is innovative collaboration integrated into the school culture? 2) How do ICT leaders perceive the sustainability of collaboration in their schools in terms of expanding/diminishing? To create a collaborative school culture, CL activities were designed by 513 Israeli ICT leading teachers who acted as 'agents of change'. These projects were performed in small teams combined between various schools and suitable for their organizations. The aim of these activities was to precede collaboration within the teaching staff and between teachers, students and parents. The study was conducted in the qualitative research paradigm. The participants were asked through an open-ended online questionnaire to describe their experience as the projects leaders. Thematic analysis based on the principals of Grounded Theory was conducted. The findings expressed the participants' understanding of the benefits they gained through participating in CL projects and the necessity of creating a school culture, which embraces e-collaboration. Despite the difficulties they raised, most of the participants were interested in continuing and even expanding CL in the following year. They were willing to implement it in other classes or subjects within their schools, with other schools, or with the extensive school community.

**Keywords:** ICT leaders, e-collaboration, sustainability of innovation, school culture

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## **Initial findings from the subject matter expert panel feedback on cybersecurity organizational preparedness of Tuscan small to medium businesses**

*[Research-in-Progress]*

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### **Extended Abstract**

It has been well documented over the news and the scholarly research outlets that data breaches are continuing to impact organizations of all sizes. While larger organizations have Information Technology (IT) teams to mitigate such risks, while ensuring the organization is prepared for cyber-attacks, Small to Medium Businesses (SMBs) are lacking awareness, knowledge, and competences of cybersecurity. However, it is still unclear the current level of risk to cyber-attacks and the cybersecurity preparedness of SMBs. SMBs are significant to most countries in the western world as they represent a significant volume of businesses. When it comes to cybersecurity, significant number of SMBs are part of the supply chain of larger organizations and can cause disruptions to a whole industry. In Italy specifically, 99.9% of all organizations are considered SMBs, while accounted for 58% of the total Italian's Gross Domestic Product (GDP). This phase of a research-in-progress project discuss the development of a mixed methods, quantitative and qualitative, instrument based on prior literature to measure organizational cybersecurity preparedness as well as risk management, along with the documentation of how it was evaluated by a group of experts for internal and external validity. Specifically, the initial survey instrument included four key sections: (1) Knowledge and Awareness of Cyber-Threats; (2) Cybersecurity Business Continuity Planning (BCP); (3) Sources of Cyber-Threat Intelligence; and (4) Cyber-Attack Categories. The quantitative instrument for organizations was first written in English from several prior published literature and the *Ponemon Institute Study on the Cyber Resilient Organization's* top 10 cyber-attack categories. It was then translated to Italian and reviewed by five native Italian speakers who proposed minor wording adjustments. Following, an expert panel qualitative and quantitative survey evaluation of the translated instrument was conducted. About 50 cybersecurity and organizational management experts were invited to participate to provide their opinion on the initial survey instrument to validate the draft survey for participants, assess the instructions as well as questions clarity and relevancy before we moved to conducting the pilot study. Results from 21 experts (~42% response rate) were obtained with list of minor adjustments to the instrument with several specific changes to the clarity of the instructions and questions to ensure that even small business owners or decision makers who have limited or no knowledge of cybersecurity can still understand and respond to the survey. Conclusions and recommendations for further steps of the research are provided.

**Keywords:** Cybersecurity organizational preparedness, expert feedback on cybersecurity instrument, Italian small to medium businesses, cybersecurity risk management, cyber resilience.

## **Creativity management in the Portuguese public higher education: The challenge of turning creative potential into performance**

*[Complete Research]*

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### **Extended Abstract**

Four schools of the Polytechnic Institute of Lisbon were studied. Understanding how creativity is managed within the public higher education scenario was the main goal of this work. Nowadays, creativity goes beyond having a pool of creative teachers and students. What matters the most is effectively managing the knowledge. This becomes a more complex issue when we look at the social and technological pressures felt, namely the need for applied knowledge in order to solve new and practical problems. Thus, the driving question was: *How to enhance a more effective creativity management practice by transforming creative potential into creative performance in public higher education schools of the Portuguese polytechnic system?* The research design, an exploratory case study, was driven by the hypothetical-deductive approach and involved the collection of qualitative data and following the spirit of the triangulation of the sources of evidence. In this sense, websites and newsletters, as well as newspapers, were also analysed. In addition as data collection technique, semi-structured interviews were conducted with privileged interviewees. Content analysis was performed by analysing categories and producing graphs and tables reflecting relative frequencies data. The hierarchical framework for the study of creativity, also known as the 6 Ps model (c.f. Kozbelt et al., 2010), was adopted. It is divided and organised into two dimensions: creative potential (person, process, press) and creative performance (product, persuasion, personal interactions). Discussing an effective creativity management stance towards enhancing the knowledge process in public higher education, circumscribing creative potential and performance indicators, presenting strategies to transform potential into performance are some implications of this work. Conclusions shows that the problem is not the lack of creative potential, which exists significantly. Creative performance does not keep up with the existing potential. This non-correlation stems from some organisational obstacles, including the heavily bureaucratic and traditional public administration. The process of transforming creative potential into parallel performance indices is constrained by these barriers to creativity. According the above conclusions this study reinforces the paradoxes of creativity. In order to have a good creativity management in education system it is critical to identify their barriers and remove them. Therefore, is possible to turn potential into creative performance.

**Keywords:** Creativity management, the Six Ps model, public higher education, case study.

### **References:**

Kozbelt, A., Beghetto, R., & Runco, M. (2010). Theories of creativity. In R. J. Kaufman & R. Sternberg (Eds.), *The Cambridge Handbook of Creativity* (pp. 20-47). Cambridge University Press.

## **Social analytic variables: Proactive remediation for human factors on cybersecurity**

*[Research-in-Progress]*

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### **Extended Abstract**

Within cybersecurity humans are and continue to be the weakest link. Social analytic variables are becoming more noticeable factors significantly affecting cybersecurity threats. Social analytic variables refer to aspects of a user's behavior or relevant human factors. The social analytic variables for this research includes: unauthorized or inappropriate associations, personal inflexibility, disregard, unusual contacts, unusual business travel, unusual personal travel, withdrawal, mental instability, impulse control, workplace satisfaction, and workplace events. These social analytic variables reflect types of observations a cybersecurity analyst can make based on relevant social events. With that, the focus on human elements within cybersecurity has become a hot topic in the industry. The importance of proactive remediation for human factors has increased. Social analytic variables are pertinent to the increase of cybersecurity threats. This research study aims to identify security measures to remediate the risks and potentially reduce the impact of social analytic variables on cybersecurity.

This research study will perform a qualitative analysis on each social analytic variable to identify cybersecurity measures best suited to reduce the risks associated with the applicable variable. Many cybersecurity frameworks like NIST SP800-53 contain a complete guide to defining all aspects of an effective risk management. It also contains the criteria and processes needed to assess and mitigate risk. This study will similarly present guides mapping to practical aspects of cybersecurity within an organization. From each of the variables assessed a detailed mapping of risk reduction measures will be presented. This paper will provide the analysis results and mapping that can be leveraged to develop cybersecurity strategies for risk reduction in relation to human factors in an organization.

**Keywords:** Cybersecurity, remediation, human factors, insider threat, analytic variables.

## **A team-based training game guided by a humanoid robot**

*[Research-in-Progress]*

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### **Extended Abstract**

Humanoid Robotics (HR) is an emerging field striving to deploy computers capable of resembling human shapes and mimicking human movements, gestures, and behaviors. The evolving capability of HR to interact with human offers groundbreaking ways for learning and training opportunities. Studies show that HR can offer instructional experiences for fostering creativity, entertainment, enjoyment, and curiosity. Furthermore, these added values represent a prominent step forward compared to avatars that were traditionally used for converting such experience to be appealing (Johnson et al., 2016). These added-values are essential for empowering instructional opportunities offered as gamified experiences (Johnson et al., 2016). We present our project focused on the deployment of an activity to be experienced in an escape room aimed for team-based training that is scaffolded by a humanoid robot, NAO. An escape room is a well-known approach for gamified activities focused on a simulated scenario experienced by team-based participants. Usually, the simulation takes place in a physical environment where participants must complete a series of challenges in a limited amount of time (Nicholson, 2018). During this experience, players learn something about the assigned topic of the room. In the current simulation, the participants have to “save the Israeli nation” by locating sensitive information stolen and stored in a vault consisting of four locks. Team members have to look for hints and solve riddles mediated by NAO. Each solution provides a unique code opening one of the four locks. NAO is also used to provide ongoing feedback on the team's performance (see the clip [here](#)). We captured the proceeding of our activity and used to conduct an evaluation study among ten experts in related areas. The experts were interviewed on their overall assessment of the activity as well as their perception of the added value related to the robot. The results were very encouraging on the feasibility that NAO can serve as a motivational tutor in adults' collaborative game-based learning. We believe that this study marks the first step towards a template for developing an innovative team-based training using escape rooms supported by a humanoid robot.

**Keywords:** Humanoid robot, NAO, escape room, training, team-based activity.

#### **References:**

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## **Initial insights from subject matter experts on a phishing email alert system prototype using audio, visual, and haptic warnings**

*[Complete Research]*

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### **Extended Abstract**

One of the most significant threats to both personal and organizational data loss are phishing emails, which also defined as email spam messages. Prior literature and industry reports indicate that phishing and/or social engineering are an overwhelming cause of cybersecurity incidents with some reports indicating it as high as 93%. Significant volume of prior literature documented that users are continuing to click on phishing links in emails even after phishing awareness training, thus, it appears that there is a strong need for creative ways to alert and warn users to signs of phishing in emails. Understanding a more aware state of mind, ‘System 2 Thinking Mode’ (S2), describes an individual in a more aware state when making important decisions. Significant prior research indicated several ways to trigger S2 include audio alerts, visual alerts, and haptic/vibrations. While the use of such S2 triggers have been used for many years in other fields, such as medicine with urgent care alerts/warnings, transportation with automobile dashboard alerts/warnings, to name a few, integrating S2 triggers into the field of cybersecurity appears to be limited. Thus, assisting the end user in noticing signs of phishing in emails could possibly be studied through the delivery of audio, visual, and haptic (vibration) alerts/warnings. This study outlines the empirical results from the first study in series of research studies that are aimed to assess the S2 triggers in the context of alerting end users to signs of phishing in emails read via mobile devices. Specifically, in this study we report the results from feedback provided by 32 Subject Matter Experts (SMEs) on an initial prototype design and development of a mobile email phishing alert and warning system. The prototype developed is aimed at alerting and warning users to the signs of phishing in emails in an attempt to switch them to S2 state of mind. The preliminary results of the SMEs survey indicated several features for a phishing alert and warning system, resulting in the developed mobile phishing alert and warning prototype. Visual icons were chosen for each sign of phishing used in the prototype, as well as voice over audio warnings, and haptic vibration warnings. The preliminary results also determined task measurements, ‘ability to notice’, and ‘time to notice’ signs of phishing in emails by users.

**Keywords:** Phishing, cybersecurity, social engineering, cyber threat mitigation, cyber alerts, cyber warnings, human factor in cybersecurity.

## **Fast and frugal knowledge risk assessment: Utilizing domain expertise and multiple reference organizations**

*[Research-in-Progress]*

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### **Extended Abstract**

This paper proposes improvements to Delak and Maasdorp's (2019) MARJETKA approach for rating knowledge-related risks and its expression in financial terms. We focus on what we see as a central weakness of their approach, namely that a comprehensive risk assessment reduces the ability to differentiate between organizational risk profiles. Delak and Maasdorp (2019) achieved sufficient differentiation by relying on an analyst to subjectively pick up to 15 risks from a list of possible knowledge-related risks. We argue that this solution inserts the analyst between the respondents and the risk assessment data in a way that might lead to distortion. We propose basing the assessment of relative knowledge-related risks on domain expertise rather than leaving it to subjective judgements by an analyst working with respondent data. To this end, we first employed a Delphi technique amongst an expert panel to identify knowledge management threats and risks, which we then use (instead of analyst choice) for identifying salient (top five) risks as a part of the MARJETKA approach. We believe this modification improves the approach because it relies on respondent data and expert panel inputs instead of analyst choice.

Our second proposed improvement is to use multiple reference organizations for calculating and expressing risk financially. Whereas MARJETKA only used the insurance levels of one large organization, we now identify multiple reference organizations per industry for the financial expression of the total knowledge-related risk. So we will be able to enlarge the sample of financial risk calculation and more precisely express the organization's total knowledge risk exposure per industry.

We believe that our suggested improvements will make the MARJETKA approach simpler and faster. Furthermore, the financial expression of risk will be more widely applicable as a result of the different reference organization per industry, whilst relying on the expertise and respondent data, instead of the analyst's choice, provides a better basis for differentiating organizations' risk profiles.

**Keywords:** Knowledge management, MARJETKA approach, knowledge risk assessment.

#### **Reference:**

Delak, B., & Maasdorp, C. (2019). A measurable approach for risk justification of explicit and tacit knowledge assessment. *Online Journal of Applied Knowledge Management*, 7(1), 67-85.

## **Knowledge Management and its role on universities as learning organizations**

*[Research-in-Progress]*

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### **Extended Abstract**

Universities' gaps are yet to be filled relatively to the integration in curriculum innovation of knowledge which derives from faculty research. This also happens on account of only a limited share of research outputs being eligible for accreditation the remaining portion becoming neglected most of times. In a previous article we illustrated the existence of such gaps in ISEG, a Portuguese Higher Education Institution (HEI). Now we purpose to demonstrate how the utilization of knowledge management (KM) leading to cross disciplinary methodologies and research centers networking and consortium in ISEG meaningfully contributed to overcome those gaps. Knowledge management is decisive for universities in today's world as Navaz et al. (2014) state and it clearly enhances research productivity and teaching quality, despite several kinds of barriers still impending upon research sharing as in Khalil (2012) and Howell and Annansingh (2013). Most of the models which purpose to use KM to overcome the above caveats, for instance Barley et al. (2018), show a strong articulation between Human Resources Development (HRD), KM and curriculum design. In some of the most fruitful cases, communities of practice (COP), knowledge communities and even informal communities of peers are to be found among the leading enhancers. The ways KM could improve knowledge share in HEI include the systematic repository of all the socially pertinent research outcomes as well and rewarding somehow faculty accordingly. This would contribute as well to improve innovation and social responsibility of universities.

**Keywords:** Knowledge management, universities, learning organizations, research centers networking, Portugal.

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## **Residual privacy effect - willingness to provide data**

*[Research-in-Progress]*

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### **Extended Abstract**

In the age of Big Data, users provide knowingly or unknowingly personal details such as browsing patterns, preferences, friends, purchases, and more. We are interested in the decision-making mechanism of users when asked to provide personal data. Several studies explore a variety of parameters concerning privacy decision-making (Acquisti, 2009), and theories (such as the Privacy Calculus) model this set of considerations. We wish to examine a single variable, derived from the prospect theory (Tversky & Kahneman, 1992), whose effect on the privacy decision-making mechanism was not explored yet. The variable is *the amount of privacy that the user believes he still has*. We name it “Residual Privacy” (RP) and claim it effects users’ decisions concerning how much and in what price they supply additional personal data. In this context, we wish to investigate a specific context where a business entity asks the user for personal data. The user might estimate that (a) most of his/her data is already known to the business entity, or (b) only a few data details are known to the business entity.

Our Research Question is formulated as followed: *How does the user’s RP affect the willingness to provide details to different applicants, and at what price?*

We plan to run 500 questionnaires, including various scenarios, simulating the willingness to provide personal data to different entities, with different amounts of user data (e.g., Google, a local research body, online store). The willingness to provide personal details, the requested tangible/non-tangible compensation and the identity of the business company are the main research factors. The contribution of the study derives from its applicability. Framing the user’s strategy to provide personal details will help to better understand users’ decision making in situations where privacy-related data is involved. The importance of the study lies in a new concept where RP can partially explain the behavior of users when it comes to privacy-related decision making.

**Keywords:** Privacy, self-disclosure, WTA, decision-making.

### **References:**

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## **Distributed ledger technology survey: A knowledge discovery process**

*[Research-in-Progress]*

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### **Extended Abstract**

Scientific survey and state of the art papers in highly dynamic or emerging research areas and paradigms are increasingly suffering from gaps between the static nature of traditional publications and the rapid development in the industry. This paper proposes a dual approach mixing traditional scientific writing with dynamic collaborative platforms supporting real-time and detailed knowledge management. The approach is applied to the area of Distributed Ledger Technology (DLT) in the context of a research project aiming at assessing the impact of blockchain technology on audit and control professions. Our large and extensive review, covering over 250 resources ranging from scientific literature, books, industrial white papers and consortia, up to experimental project documentation, initially led us to a document of over 100 pages. It became clear at this point that we needed to find a way to better account for both the vast amount of resources and the speed of evolution of the area drawing lots of attention. Moreover, collaborative contribution and cooperation also appeared to be a desirable feature. Hence our idea to use a Wiki to support the process and propose it as a supplement to the traditional survey: <http://dltwiki.unige.ch/>. As a result, this paper provides all the relevant elements such as definitions and analysis framework describing the DLT domain and its constituencies, while leaving the fast-changing elements relating the specific approaches and platforms as evolving material on the Wiki. The proposed analysis framework is first structured by identifying the fundamental and secondary properties of DLT. The framework then provides an inventory of DLT components followed by key current challenges. While all the underlying material relating to specific platforms and their descriptions is on the Wiki, we provide the current summary assessment of existing platforms along three main categories and corresponding criteria.

**Keywords:** Distributed Ledger Technology, DLT, blockchain, state of the art, DLT evaluation, knowledge management.

## **What motivates academics to hide knowledge?**

[Complete Research]

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### **Extended Abstract**

Knowledge sharing has been the source of extensive academic research for quite some time. Despite so many efforts devoted to investigating the enablers of knowledge sharing, it is still not a common natural behavior in organizational work settings. From the last decade or so, research attention has been drawn to knowledge hiding. Connelly et al. (2012) defined knowledge hiding as “the intentional attempt by an individual to withhold or conceal knowledge that has been requested by another person,” and contended that it involved three dimensions -- playing dumb, evasive hiding, and rationalized hiding. Although literally knowledge hiding seems to imply opposite meaning to knowledge sharing, it does not refer to behavior contrary to the latter, since “a lack of knowledge sharing is likely only driven by an absence of knowledge itself”(Connelly et al., 2012, p. 67). The purpose of this study was to investigate the reasons and motivations that drive individuals to hide knowledge in the academia context. A sequential mix-method research design was used to help achieve a better understanding of the knowledge hiding phenomena. Data was first collected from interviews with faculty members from a Chinese university. This qualitative study identified three main constructs that motivate knowledge hiding -- interpersonal relationships, personal traits, sustaining personal knowledge advantage. The three constructs were further tested in a larger scale with an online questionnaire. Results suggested that “personal traits” and “sustaining personal knowledge advantage” constructs significantly influenced knowledge hiding behavior, but “interpersonal relationships” construct had no significant influence on our sample’s knowledge hiding behavior. It is recommended that in order to discourage knowledge hiding behavior in work settings, an organizational culture, where people are encouraged, recognized, and even rewarded for not hiding knowledge and where making mistakes is perceived as a learning and development process rather than an activity that might lead to losing face, need to be developed.

**Keywords:** Knowledge management, knowledge hiding, motivations, academics

#### **Reference:**

Connelly, C. E., Zweig, D., Webster, J., & Trougakos, J. P. (2012). Knowledge hiding in organizations. *Journal of Organizational Behavior*, 33(1), 64-88.

<https://doi.org/10.1002/job.737>

## **ICT education in dental students: A systematic literature search and the need of new research in this area**

*[Research-in-Progress]*

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### **Extended Abstract**

The use of computer technology in the healthcare fields is increasing around the world. Hospitals, medical schools, private practitioners not only integrate specific technological machines but also desktop computers, wearable technologies, and information systems to manage the Electronic Health Record (EHR). In a scientific world, the primary used language is English, however, some studies affirm the necessity of the academic literature in the Spanish language to increase the knowledge base of Information and Communications Technologies (ICT) for the benefit of the Spanish-speaking community. The purpose of this systematic literature search study is to identify if there are any increases in the number of academic articles related to ICT education for dental students in the Spanish language. This study results confirm the limitations of ICT literature in Spanish, using the Spanish term ‘TIC- Tecnología de información y comunicación’. For dental students, ICT is a protagonist element in their academic formation. This study contributes to the body of knowledge, arguing that there is a necessity and an opportunity for more research on the topic of ICT in the formation of dental students as professionals. Also, we see a need for research with this topic in the Spanish language.

**Keywords:** Information and communication technology, ICT, TIC, education, dental students, digital dentistry, knowledge.

## **Conceptual learning through virtual reality and traditional video platforms**

*[Complete Research]*

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### **Extended Abstract**

The emergence of Virtual Reality (VR) technologies offers potential new tools for learning for all. The research on VR usage in education has been incommensurate with the increasing popularity of such systems. Little has been found in the literature about whether an embodied education system like VR could facilitate abstract conceptual learning.

To fill this gap, our study compares how students learn statistical concepts through a VR platform and a traditional excel video platform. Seventy-five undergraduates from a large university in Northeast United States participated in the experiment with three conditions. The control group watched an 8-minute video explaining statistical concepts in Excel. The Static VR (SVR) group watched the same content in VR demo, and the Exploratory VR (EVR) group watched the same session followed by five minutes of free manipulation in the VR environment with the dataset shown in the demo. All groups completed a pre-test before their session, a post-test immediately afterwards, and a follow-up test two weeks later.

The results show that although all groups demonstrated immediate learning gain followed by some learning loss two weeks afterwards, traditional video platform saw the biggest immediate gain as well as biggest loss after two weeks. Participants in VR groups made moderate gains after the session but were able to retain the knowledge much better. VR groups rated their session as significantly more effective than the video group two weeks later. Participants also enjoyed the VR session and data representation significantly more than the traditional video session. Data suggests that enjoyment of the VR sessions may contribute to higher knowledge retainment.

This study has a number of implications on training and learning in organizations. Human capital departments can focus on employees' subjective evaluation of training effectiveness that is likely to be associated with performance. Implementing VR for training in the workplace may show a significant advantage in the longitudinal retention of knowledge. In conclusion, the study expanded the literature with a deeper understanding of the various impacts of VR on learning comprehension and recall in the business management area.

**Keywords:** Virtual reality, embodied learning, experiment, excel, video, conceptual learning, longitudinal knowledge retention.

## **A balanced Body of Knowledge and Skills (BBKS) approach to prepare the health care workforce to manage pandemic data and information**

*[Research-in-Progress]*

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### **Extended Abstract**

The world is currently dealing with the coronavirus or COVID-19 pandemic that has impacted all aspects of our lives. In March of 2020, the World Health Organization (WHO) declared COVID-19 a pandemic requiring a global coordinated response. Immediately all data and information on the pandemic from every country was being tracked, processed, distributed, and communicated instantaneously. Key global pandemic information collected included data on screenings, patient symptoms, infection rates, those deceased due to the virus, and medical supply/inventory status. The processes of collecting, sorting, analyzing, and communicating is being accomplished by individuals who mostly possess a single body of knowledge and/or set of skills in a specific health care discipline. Most of the health care workforce are credentialed in one discipline. The current pandemic health crisis has created a demand for individuals who possess knowledge and skills from multiple disciplines necessary to successfully manage pandemic data and information. The proposed Balanced Body of Knowledge and Skills (BBKS) approach derives from multiple specialty areas including an applied understanding of epidemiology, statistics, research methods, public health, informatics, telehealth, education, and disaster and emergency preparedness, including risk assessment and mitigation. The BBKS will be accessible to the health care workforce through multiple learning modalities, including cross-training of disciplines, interactive online courseware, hands-on practicums, webinars, and skill-based workshops. The Kirkpatrick Model will be used for training evaluation of identified measurable competencies, as well as evaluating the transfer of learning objectives in applied settings. Specifically, the first three levels of Kirkpatrick's Model will be utilized in the survey instrument: *Level 1* on satisfaction and relevance, *Level 2* on the degree to which participants acquired knowledge and skills, and *Level 3* on application of what was learned.

**Keywords:** Skills, knowledge, information, pandemic.

## **Exploring motivation, career strategies and role of mentors amongst women occupying IT managerial positions**

*[Complete Research]*

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### **Extended Abstract**

The presence of women in Information Technology (IT) jobs is disproportionately low. For instance, in Poland only 13% of IT students are female. Not enough is known about the challenges faced by female professionals. The experiences of women in gender-atypical work contexts (e.g. IT firms) deserves more scholarly attention, given that more women enter non-traditional work domains (Wallace, 2014) and that the challenges faced by them are known (Kyriakidou, 2012). Nevertheless, it appears that there is a lack of research about the career strategies and motivation of women in IT jobs. This paper investigates the motivation, background, and career strategies of female IT professionals, as well as the role mentors might have played in their development. This study specifically asks: (RQ1) What career strategies did women follow? (RQ2) What motivated them to choose an IT career? (RQ3) What role, if any, did mentors play in their development?

In-depth interviews of 10 women who are working on different technical projects in IT managerial positions in Poland were conducted after they were recruited in a snowball sample. Surprisingly, nine of the 10 interviewees did not study IT, but graduated from economics mainly with finance and banking specializations. This highlights that the normal rules for career trajectories do not apply in the case of women. The women in the sample followed three different gendered strategies to succeed: The first is to adopt masculine characteristics; the second is a hybrid approach of adopting required gender roles in different situations; and the third strategy is demonstrating self-confidence by working hard and performing extraordinarily compared to their male peers. Their motivation was driven by the high demand for IT jobs and salary benefits. Finally, mentors for women in IT seem to be scarce and all women bemoaned this lack. The contribution of this paper is that it shows that women do not follow the expected IT career trajectory as they enter IT through lateral career shifts necessitating supplemental IT education. Furthermore, although various career strategies exist, gender plays a role in all of them.

**Keywords:** IT sector, women in IT sector, career strategies, mentor.

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- Kyriakidou, O. (2012). Fitting into technical organizations? Exploring the role of gender in construction and engineering management in Greece. *Construction Management and Economics*, 30(10), 845-856. <https://doi.org/10.1080/01446193.2012.714870>

## **Student participation in virtual synchronous classes: What impact does the style of the professor have on student perception and participation?**

*[Research-in-Progress]*

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### **Extended Abstract**

In this study, we will examine how undergraduate and graduate students adapted to virtual synchronous classrooms during the stay-at-home orders issued because of the COVID-19 pandemic. This pandemic forced many schools to move traditional face-to-face classes to a virtual synchronous modality, and many traditional students taking face-to-face classes were now forced into a virtual synchronous modality for the first time. This was a new modality for a vast number of faculty and students alike, as the virtual synchronous modality has predominantly been used by older, non-traditional students in a distance-education modality. This investigative study will survey undergraduate and graduate students to explore the factors influencing a student's perception of the virtual synchronous modality compared to the traditional face-to-face modality. This paper will investigate whether a student's perception of their professor influences their perception of virtual synchronous classes and, ultimately, their participation in the virtual synchronous class. To measure student perception, we will adapt the five scales constructed by Platt et al. (2014) to compare online to face-to-face classes. Given the uncertain nature of the ability for universities to resume normal face-to-face classes, virtual synchronous classes may become much more common. This paper will help faculty understand how student perception of a faculty member and student interaction influence the student perception of a virtual synchronous class. Based on this understanding, faculty can adapt their style to positively influence student perception in their virtual synchronous classes. In addition, this study can assist faculty in implementing strategies that will increase the participation of a student in one of these classes.

**Keywords:** Student participation, faculty self-presentation, student perception, virtual synchronous, face-to-face.

### **Reference:**

Platt, C., Amber, N., & Yu, N. (2014). Virtually the same? Student perceptions of the equivalence of online classes to face-to-face classes. *Journal of Online Learning and Teaching*, 10(3), 489–503.