METALOGUE'S VIRTUAL AGENT FOR NEGOTIATION: ITS' EFFECTS ON LEARNING EXPERIENCE, METACOGNITIVE AND INDIVIDUAL-AND-COMMUNITY-LEVEL ATTITUDES PRE-AND-POST INTERACTION

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In loving memory of my parents,
doctor Georgios Makris and teacher
Georgia Tsiotou-Makri

Abstract

The current paper explores learners' experience (system's usability)(macro-features) when the METALOGUE (Multiperspective Multimodal Dialogue: dialogue system with metacognitive abilities) system (virtual agent) was used to teach metacognitive- and individual-and-community level attitudes and skills (micro-factors) in multi-issue negotiation. The virtual agent is component of the METALOGUE pilot study that was run at the Hellenic Parliament in Greece and developed as part of the EU METALOGUE research project (http://metalogue.eu). METALOGUE project has designed and evaluated its' multimodal dialogue system including several models (i.e. cognitive, learning, interaction and dialogue management) as exemplified in many modalities such as spoken natural language, facial expressions, body posture and biosensor data. The system played the role of one of the dialogue participants and acted as a tutor guiding multiple users, with its strategic impact expanded upon intelligent virtual environments (IVEs), cognitive modelling, multimodal, multi-party human computer interaction (HCI) and technology-enhanced learning (TEL) alike.

The METALOGUE pilot study employed the pre-and-post assessment approach (experimental design) to explore the effects of the METALOGUE system on the learning experience of 41 mature learners of different demographic and academic background. First, 5 participants interacted in English in pairs with the system to investigate consecutive and overlapping visual signals and evaluate the load of information presented to achieve completeness and informativeness in the real time system context. Then, 41 participants fluent in English took part in the system evaluation session followed. They were introduced to the system's functionalities, witnessed 2 demo interactions from the facilitators, were given time to ask for clarifications and signed the consent forms. Then, each learner negotiated 3 diverse multi-issue scenarios with the system for 15 minutes for all 3 sessions. Finally, they were asked to answer pre-and-post learning experience questionnaire in using the system (macro-factors) and metacognitive-and individual-and-community-level attitudes and skills (self-efficacy, self-regulation, interpersonal and problem-solving skills, civic action, individual readiness to change and mastery goal orientation) (micro-factors) through multiple choice related questions adopted for the needs of the present research.

Findings indicated significant and favourable associations between learners' system usability questions post-interaction and between self-efficacy, self-regulation, individual readiness to change, mastery goal orientation, interpersonal and problem-solving skills and civic action before-and-after system's learning experience. Implications, limitations and avenues for further research are discussed in view of multimodal dialogue learning environment.

Keywords: multimodal dialogue system, interactive learning, metacognition, individual-and-community attitudes and skills

1. INTRODUCTION

When virtual agents become a powerful self-motivated tool for applying computer science to education or business, they either tend to execute the behaviour (activity) addressed each time (e.g. negotiate, teach) or rely on their virtual environment architecture to support or advance experiential learners' knowledge, attitudes and skills, in terms of critical thinking, body posture and movement coordination, logical reasoning, interpersonal and problem-solving, decision making, natural language and affective regulation in bilateral or multi-agent systems context [1]. Although virtual agents are integrated in diverse training and e-learning environments worldwide, issues relating to whether they are able to act really autonomous on behalf of human agents or merely assist them in context-specific learning activities, continue to bear challenging questions for ongoing intelligent virtual environments' research in the learning domain each time [2].

In the above context, the current paper aims to elaborate on the results of METALOGUE's (Multiperspective Multimodal Dialogue: dialogue system with metacognitive abilities) system (virtual agent) pilot study that was run at the Hellenic Parliament in Greece, developed as part of the EU METALOGUE research project (http://metalogue.eu) and explored learners' experience (system's usability)(*macro*-features) when METALOGUE virtual agent was employed to teach metacognitive- and individual-and-community level attitudes and skills (*micro*-elements) in multi-issue negotiation. METALOGUE project has designed and evaluated its' dialogue system including several models (i.e. cognitive, learning, interaction and dialogue management) as exemplified in many modalities such as spoken natural language, facial expressions, body posture and biosensor data. The system played the role of one of the dialogue participants and acted as a tutor guiding multiple users, with its strategic impact expanded upon intelligent virtual environments (IVEs), cognitive modelling, multimodal, multi-party human computer interaction (HCI) and technology-enhanced learning (TEL) alike. The paper sizes up virtual agents deployed in real-world educational learning and training experiences in a short summary review (**Section 1.1**) and presents the research methodology including the description of the METALOGUE dialogue system and the findings of the study (**Section 2**). Lastly, this paper also synopsizes the results, the properties of their implications and addresses additional issues for future studies (**Section 4**).

1.1 Literature review

Intelligent virtual learning environments have been indicated to assist mature students' positive attitude towards their intention to take part in the learning activities [3], support higher education learners' motivation, ease and confidence during learning experience and help them sustain an improved attitude towards their learning activities during interaction and engagement with the learning course objective [4]. Employed as relevant tools for advancing learner engagement, participants' inspiration through instruction and guided direction to finish the learning tasks and provide proper feedback [5], they motivate, support and advance students' learning [6] and improve learning retention and transfer performance [7] in comparison to non-virtual agent environments [8]. Virtual agents have been also demonstrated to improve learners' intention to adopt them as a decision tool [9] and more convincing to differentiate learners' perceptions in task-focused learning environments especially when they are appealing [10].

Successful learning is also considered to be facilitated or achieved by the interactions between individual, attitudinal and environmental motivational influences. To know or think about how well we understand something and modify our actions to successfully complete tasks (meta-cognition), is claimed to be critical for effective learning in any instructional context applied [11]. The ability to fulfil a task (self-efficacy) is also translated as a motivational factor of learning in that individuals with higher levels of self-efficacy tend to perceive challenging tasks as something to be managed and controlled (i.e. mastered) and focus more on the ways they will pursue their learning assignments or designated tasks [12]. In turn, they are expected to attain the ability to mobilize, control, sustain, overt and adapt their thoughts, feelings, attention, concentration, attitudes and behaviour over performing occurring learning tasks [13] (self-regulation). High self-regulated learners are considered to hold higher

motivation or engagement (individual), use better learning strategies (attitudinal) and react (or respond) to environmental demands more appropriately [14]. As revising their thinking and behaviour towards fulfilling any learning activity at hand [15], they tend to practice their logical and analytical thinking for problem-solving tasks, interact efficiently with others to evaluate impending circumstances (interpersonal and problem-solving skills) and become aligned to advocate mastery as a goal (mastery goal motivational belief) in their learning assignments, opting for stimulating tasks that adhere to additional learning [16]. During social learning interaction, as learners deal with socially intelligent human-to-human attitudes and behaviour such as social relatedness (affiliation with others) [17] in building common understanding, empathy and sharing relationships, they are expected to be more supportive of and benefiting from occasions to be involved with the society and their community to proactively assist others (civic action) [18] and indicate positive reactions towards the dissemination and execution of change tasks (readiness to change) [19].

Based on the above rationale and argumentation, therefore, the present paper attempts to elaborate on or "merge" a comprehensive exploration of the relationships indicated between METALOGUE's virtual environment usability evaluation (*macro*-, dialogue system's user experience elements) and the aforementioned metacognitive- and individual-and-community level-associated attitudes and skills' factors (*micro*-, i.e. self-efficacy, self-regulation, interpersonal and problem-solving skills, mastery goal orientation, civic action and individual readiness to change).

2. METHODOLOGY

2.1 Study design

The METALOGUE pilot study employed the pre-and-post assessment approach (experimental design) to explore the effects of METALOGUE's dialogue system on the learning experience of 41 mature learners of different demographic and academic background. The average age of the participants was 20 years old and 65% were male. Before the actual user-system evaluation sessions, a pilot study was conducted including 5 learners who interacted in English in pairs with the system to appraise consecutive and overlapping visual signals and evaluate the load of information presented, in order to accomplish completeness and informativeness during the real time dialogue system context. Consecutively, 41 mature learners fluent in English took part in the evaluation session followed, as employed in similar studies [20]. They were introduced to the METALOGUE's dialogue system functionalities, witnessed 2 demo interactions from the facilitators and were assigned time to ask for clarifications and sign the consent forms. Then, each participant negotiated 3 different multi-issue scenarios with the system for 15 minutes for all 3 sessions (see **Figure 1** below).

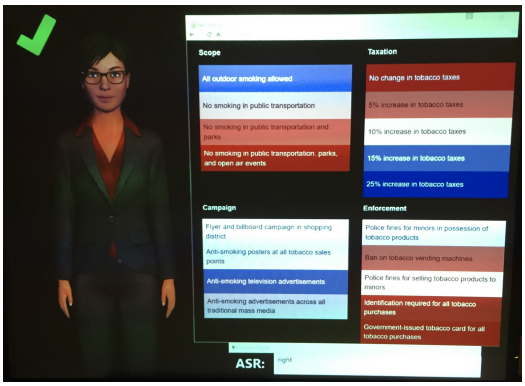

Figure 1 The Metalogue interaction display depicting the virtual agent (negotiator) and the multi-issue negotiation space

Lastly, they were asked to answer a pre-and-post METALOGUE's application experience questionnaire in English. The administered measurement tool included demographic information and user-system experience 5-Likert type questions (*macro*-factors) accompanied by the assessment of metacognitive-and individual-and-community-level attitudes and skills (*micro*-factors)(self-efficacy, self-regulation, interpersonal and problem-solving skills, civic action, individual readiness to change

and mastery goal orientation through related scales based on multiple choice questions employed for the needs of the current research.

2.2 Metalogue dialogue system

Metalogue's overall complex architecture included several models (i.e. cognitive, learning, interaction and dialogue management ones) as exemplified in many modalities such as spoken natural language, facial expressions, body posture and biosensor data, through face and eye gaze tracking and facial expression encoding, body tracking and body manner encoding, temporal segmentation and recognition of static and dynamic face and body appearances, natural language processing, gesture and facial interpretation with fusion responsible for combining the modality-specific analyses into the dialogue actions (see **Figure 2** ©METALOGUE FP7 CP p.7 below).

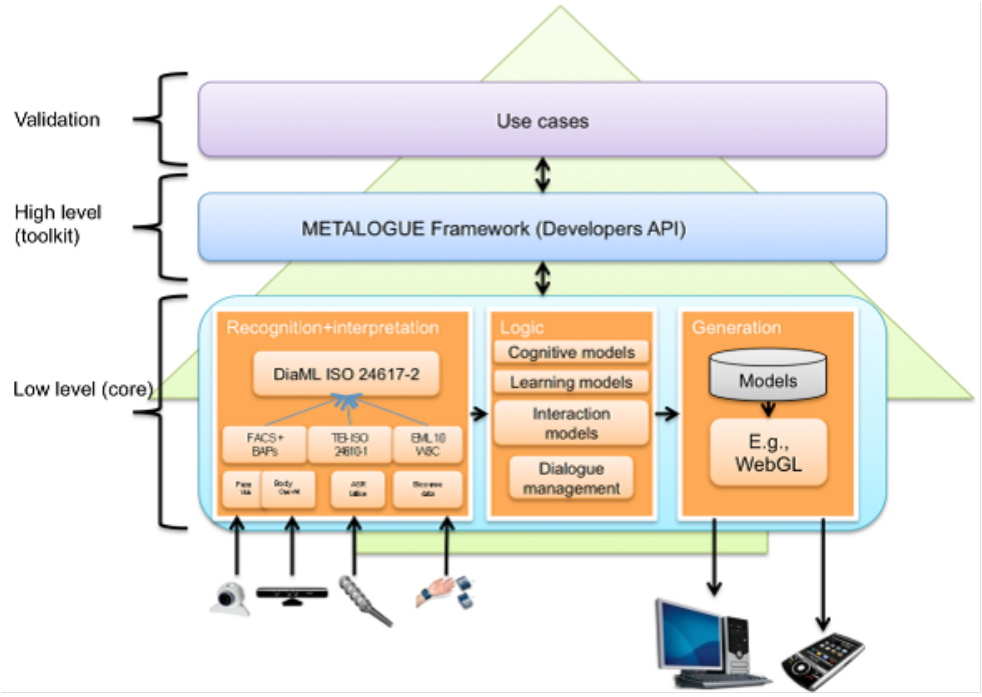

Figure 2 Overall Metalogue architecture (©METALOGUE FP7 CP p. 7)

In relation to Metalogue's intelligent virtual agent (negotiator) per se, mutual favourablness and increased empathy were indicated by non verbal cues (attitudes), such as bending forward, head nodding, developing eye contact, smiling and demonstrating body orientation movements, exhibiting responsive, fluent, open, positive interplay-manner and courtesy.

3. RESULTS

Table 1 presented below indicates the distribution of learners' responses in Metalogue's evaluation questions after interacting with the dialogue system. Synopsizing their answers, the findings revealed that participants exhibited overall moderate to strong favourable attitudes as regards the following. Whether the actions of Metalogue's dialogue system were correct, the system's role and use was clear, communicated enough information, the provision of material was just fine and useful, the dialogue system was timed correctly and in context, easy to complete tasks during interaction; the pace of interaction fast or slow enough to feel right, know what one could say at each point of the dialogue, whether the interaction with the intelligent virtual agent was natural, confident to know enough about the functionalities and use the information found in the system on his or her own; easy and natural to interact with the dialogue system, the Metalogue concept stands as an interesting idea, quite easy to understand and use, whether the system would be employed again if it was an integral

part of one's training routine and quite promising in the sense that it bears the potential to become a great skills training application; one would use a simplified version of the Metalogue dialogue system with only the content or functionality found interesting and the feedback provided during and after interaction was valuable and helped learners to become more aware of their performance.

Table 1. Distribution (%) of learners' answers in Metalogue's dialogue system experience evaluation questions after interaction

1. Do you think the actions of the Metalogue system were correct?	No, not really 2.5	Slightly 7.5	Somewhat 35	Moderately 42.5	Yes, they were spot on 12.5
2. Did the interaction with the system made sense to you?	Slightly did 12.5	Somewhat did 12.5	Moderately did 42.5	Yes, the system role and use is clear 32.5	
3.Did the system communicate enough information to you?	Slightly did 7.5	Somewhat did 27.5	Moderately did 50	Yes, the system communicated enough information 15	
4.Did the system communicate too much information to you?	Yes, the system overloaded me with information 17.5	Slighlty did 20	Somewhat did 20	Moderately did 22.5	The information provision was just fine 20
5.Was the information provided by the system to you useful?	Slightly did 5	Somewhat did 22.5	Moderately did 45	Yes, it was very useful 27.5	Slightly did 5
6.Was the system communication to you timely?	No, it was out of context 2.5	Slightly 17.5	Somewhat 35	Moderately 27.5	Yes, it was timed correctly and in context 17.5
7.Was it easy to complete tasks in your interaction?	No, it was very hard 2.5	Hard 12.5	Neutral 42.5	Easy 32.5	Yes, very easy 10
8.Was the pace of interaction fast enough to feel right?	No, it was too slow 2.5	Slightly slow 12.5	Neutral 27.5	Moderate 40	Yes, it was just right 17.5
9.Would you say that the interaction with the system was natural?	No, it was too fast 2.5	Slightly fast 10	Neutral 32.5	Moderate 37.5	Yes, it was just right 17.5
10. Did you know what you could say at each point of the dialogue?	Never 2.5	Rarely 20	Sometimes 27.5	Often 30	Always 20
11. Would you say that your interaction with the system was natural?	No, it was very artificial 5	Slightly artificial 37.5	Neutral 20	Moderately natural 25	Yes, it was quite natural 12.5
12. Are you confident you know enough about the functionalities and the information found in	Yes, very confident 30	Yes, but there are notions I did not understand 35	So and so 27.5	Not much 5	Not at all 2.5

Metalogue so you would be able to use it on your own?					
13. How easy was to interact with Meta?	Very hard 2.5	Hard 15	Neutral 35	Moderately easy 32.5	Pretty easy 15
14. How natural was to interact with Meta?	No, it was very artificial 7.5	Slightly artificial 22.5	Neutral 37.5	Moderately natural 17.5	Yes, it was very natural 15
15. Do you think the Metalogue concept is an interesting idea?	No, not much 2.5	Somewhat 2.5	Moderately 15	Yes, a lot 80	
16. Do you find the setup of the Metalogue's system intimidating?	Yes, it is quite hard to understand/use 2.5	Hard 5	Neutral 15	Moderately easy 32.5	No, it is quite easy to understand/use 45
17. Would you use Metalogue again if it was an integral part of your training routine?	Slightly hated it 2.5	Neutral 17.5	Moderately liked it 20	Yes, I quite liked it 60	
18. Do you think the Metalogue system has the potential to become a great skills training application?	Slightly useless 2.5	Neutral 12.5	Slightly promising 30	Yes, it is quite promising 55	
19. Would you use a simplified version of the Metalogue system with only the content or functionality you find it interesting?	No, no way 5	Slightly 10	Somewhat 7.5	Moderately 32.5	Yes, sure 45
20. Was the feedback provided "during" the interaction valuable to you?	No, not valuable 2.5	Slightly valuable 2.5	Somewhat valuable 37.5	Moderately valuable 37.5	Yes, very valuable 20
21. Was the feedback provided "after" the interaction valuable to you?	No, not valuable 5	Slightly valuable 7.5	Somewhat valuable 22.5	Moderately valuable 42.5	Yes, very valuable 22.5
22. Did the feedback that was provided "during" the interaction help you to become more aware of your performance?	No, not at all 5	Slightly 25	Somewhat 17.5	Moderately 32.5	Yes, very much 20
23. Did the feedback that was provided "after" the interaction help you to become more aware of your performance?	No, not at all 10	Slightly 10	Somewhat 22.5	Moderately 40	Yes, very much 17.5

Hierarchical regression analyses were conducted to test for the prediction of *individual readiness to change before-and-after* users' interaction with Metalogue's dialogue system. Before proceeding with hierarchical regressions, we assured that all prerequisite conditions related with this analysis (e.g.

lack of multicollinearity, deviations from normality, and influential cases) were met. The results from these analyses are presented in **Tables 2** and **3** that follow below. In all analyses corresponding each time to the prediction before and after, respectively, at the first step we entered self-efficacy before-after and then the rest of the independent variables again before-after (self-regulation, interpersonal and problem-solving skills, civic action and mastery goal orientation), accordingly. The results reported in **Tables 2** and **3** below indicate the outcomes of the final relationships occurred between the prospective variables. A significant relationship was indicated *between self-regulation before* and *individual readiness to change before (β=.65, p<.001),* explaining an additional 42.3 percent (F(2,38)= 15.73, p<.001) of the variance in *individual readiness to change pre-Metalogue's system interaction* (**Table 2** below).

Table 2. Hierarchical regression analyses predicting *Individual Readiness to Change before interaction*

	Individual Readiness to Change before		
	β	R^2	Δ R^2
Step 1: Main effects			
Self-efficacy before	.17		
Step 2: Main effects			
Self-regulation before	.65***	.45***	.42***

Notes: ***p < .001 (one-tailed)

The relationships between self-regulation after and interpersonal and problem-solving skills after with individual readiness to change after were significant, indicating self-regulation after as the best predictor (β=.54, p<.001 and β=.43, p<.05, respectively). Self-efficacy after accounted for 13% of the variation in individual readiness to change after when used as the first predictor, while the final model comprising the rest of the independent variables accounted for an additional 9.5 percent (F(3,36)=12.19, p<.001) of the variance in individual readiness to change post-Metalogue's system interaction scores (**Table 3** below).

Table 3. Hierarchical regression analyses predicting *Individual Readiness to Change after interaction*

	Individual Readiness to Change after		
	β	R^2	Δ R^2
Step 1: Main effects			
Self-efficacy after	.37*	.13*	.13*
Step 2: Main effects			
Self-regulation after	.54***		
Interpersonal and Problem-Solving Skills after	.43*	.50*	.09*

Notes: *p < .05 (one-tailed), ***p<.001 (one-tailed)

4. CONCLUSIONS

The design, execution and assessment of Metalogue's multi-modal, multi-party and multi-perspective intelligent virtual environment system which tends to capture interactive learning and training of metacognitive awareness, knowledge and skills for both system and users, indicated significant favorable results as regards the positive attitudes and skills users experienced after interacting with the dialogue system during our evaluation sessions in Greece. Our further exploration of certain attitudes and skills beneficial for human functioning in any kind of social and community learning context also employed within our dialogue system usability survey, needs to be considered as an additional asset that corroborates further to its' competitive advantage. In relating (linking) intelligent virtual environments research with the theoretical and empirical investigation of metacognitive and individual-and-community-related attitudes and skills such as self-efficacy, self-regulation, individual readiness to change, mastery goal orientation and aspects of civic attitudes and skills like civic action and interpersonal and problem-solving skills they do bear and reflect. Such conceptual whilst also empirical exploration of the relationships between the above constructs investigated within intelligent virtual environment context, employing attitudinal scale measurement and thus, expanding related findings both from education, health, sports, business and intelligent tutoring systems alike [21], designates an important contribution and bears useful potential for both an understanding and development of such favorable attitudinal concepts and civic-related attitudes and skills for future efforts to help individuals explore and build those attitudes within artificial intelligence learning environment, even further.

As our regression analyses indicated, participants who were high in modulating their thoughts, feelings, behavior or attention towards their target-directed activities within and across Metalogue experience, were more favourable (or positive) in facilitating and being more confident in succeeding to execute change initiatives pre-interaction with the dialogue system. Post-interaction with Metalogue, those bearing stronger beliefs in their own ability to handle efficiently novel-associated conditions (as the dialogue system reflects and represents), described themselves as high in controlling their thoughts, feelings, attitudes, behavior and attention either in a structured or automated way and perceived themselves as high in making friends, listening to and taking the position of others seriously whilst attempting to resolve problems through logical and analytical ways of thinking, improved their ability to adopt and sustain change initiatives.

In that sense, therefore, in summarizing the system's significant contributions explained above, Metalogue's advanced adaptive and flexible dialogue system seemed to be successful in fueling, mastering and relating both metacognitive-and-individual-and community based interaction learning attitudes and skills, alike. In that respect, thus, it extends both previous related research findings in general learning [22] and in intelligent virtual environment systems, in specific [23]. It explores, further, the self-regulation of behavior and learning beyond traditional learning classroom context to intelligent virtual environment that challenges individuals to be proactive in improving their knowledge, attitudes and skills within our world that wields great change forces. A longitudinal research design involving larger sample size attained from different sources (cohorts) might allow greater generalizability of our results. However, the practical issues and inherent difficulties associated with the extremely demanding complexity of intelligent virtual environments' design and implementation, need to be taken into consideration.

In conclusion, the interaction within Metalogue's dialogue system indicated to be successful overall in achieving natural multimodal and multi-party user communication between the human and the virtual agent (s), given its' challenging and complex architecture achieved. Also, promising in revealing the utility of proactive behavior indicators as fundamental part of most complicated actions with a high likelihood of success and relate innovative, powerful and flexible dialogue systems with "the elements of an orientation towards others containing personal values about civic involvement and social obligation which mirror the attitude that one should make a difference, a part of what [24] have called "humanitarian and civic values" [25 pp. 328, 330]. Future research might be inspired to address Metalogue's dialogue system as a resourceful negotiation application tool based on a) the essential cooperation and coordination such adaptive and malleable systems demand being programmed to negotiate on behalf of and with their human agents [26, p. 184], b) the process of the negotiation per se followed in terms of the contracting procedure during negotiating (e.g. integratively-oriented approach) [27, p. 416] and c) the diverse conditions and defined results regarding the strategy a negotiator might take [28].

In a nutshell, within EU Metalogue collaborative research project, the development, exploration and integration of contextualized knowledge essentials reflecting a "merger" of *macro*-(dialogue system usability) and *micro*-(metacognitive- and individual-and-community level-related attitudes and skills) factors evaluated within intelligent virtual environment potentially applicable within multifaceted conditions involving negotiation, leadership, interviewing and cultural training [29, p. 86] in wide-ranging settings, for example, crisis or conflict management either in academic, political or business deals [30, p. 2], stand themselves as critical contributions, whatsoever.

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REFERENCES

[1] S. Kraus, "Automated negotiation and decision making in multiagent environments", in M. Luck et al. (Eds.), *ACAI* 2001, LNAI 2086, pp. 150-172, 2001

[2] T.J. Wang, "Educating avatars: on virtual worlds and pedagogical intent", *Teaching in Higher Education,* vol.16, no.6, pp. 617-628, December, 2011

[3] S.W. Chae, K.C. Lee and Y.W. Seo, "Exploring the effect of avatar trust on learners' perceived participation intentions in an e-learning environment", *International Journal of Human-Computer Interaction,* vol.32, pp. 373-393, 2016

[4] F. Grivokostopoulou, M. Paraskevas, I. Perikos, S. Nicolic, K. Kovas and I. Hatzilygeroudis, "Examining the impact of pedagogical agents on students learning experience in virtual worlds", in *IEEE International Conference on Teaching, Assessment and Learning for Engineering* (TALE), pp. 602-607, Australia, 2018

[5] M. Soliman and C. Guetl, "Evaluation study and results of intelligent pedagogical agent-led learning scenarios in a virtual world", in *MIPRO*, pp. 914-918, May, Croatia, 2014

[6] J.C. Lester, C.A. Converse, S.E. Kahler, S.T. Barlow, B.A. Stone and R.S. Bhogal, "The persona effect: affective impact of animated pedagogical agents", in *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems,* ACM, pp. 359-366, 1997

[7] J. Holmes, "Designing agents to support learning by explaining", *Computer & Education,* vol. 48, pp. 523-547, 2007

[8] S. Domagk, "Do pedagogical agents facilitate learner motivation and learning outcomes? The role of the appeal of agent's appearance and voice", *Journal of Media Psychology*, vol. 22, no. 2, pp. 84-97, 2010

[9] L. Qiu, and I. Benbasat, "Evaluating anthropomorphic product recommendation agents: A social relationship perspective to designing information systems'', *Journal of Management Information Systems*, vol. 25, no. 4, pp. 145-181, 2009

[10] R.F. Khan and A. Satcliffe, "Attractive agents are more persuasive", *International Journal of Human-Computer Interaction,* vol. 30, no.2, pp. 142-150, 2014

[11] J.H. Flavell, "Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist,* vol. 34, no. 10, pp. 906-911, 1979

[12] R. M. Klassen, R. P. Ang, W. H. Chong, L. L. Krawchuk, V. S. Huan, I. Y. Wong and L.S. Yeo, "Academic procrastination in two settings: Motivation correlates, behavioral patterns, and negative impact of procrastination in Canada and Singapore", Applied Psychology, vol. 59, no. 3, pp. 361-379, 2010

[13] B. J. Zimmerman, "Development and adaptation of expertise: The role of self-regulatory processes and beliefs", in K.A. Ericsson, N.Charness, P.J. Feltovich and R.R. Hoffman (Eds.), The

Cambridge Handbook of Expertise and Expert Performance, pp. 705-722, New York, NY: Cambridge University Press, 2006

[14] S.L. Wang and P.Y. Wu, “The role of feedback and self-efficacy on web-based learning: The social cognitive perspective”, *Computers & Education,* vol. 51, pp. 1589-1598, 2008

[15] J. Kuhl and A. Fuhrmann, “Decomposing self-regulation and self-control: The Volitional Component Inventory”, in J. Heckhausen and C.S. Dweck (Eds.), *Motivation and self-regulation across life span,* pp. 15-49, Cambridge, UK, Cambridge University Press, 1998

[16] B.E. Moely, K.A. Santulli and M.S. Obach, “Strategy instruction, metacognition, and motivation in the elementary school classroom”, in F. Weinert and W. Schneider (Eds.), *Memory performance and competencies: Issues in growth and development*, Hillsdale, NJ: Erlbaum, 1995

[17] M.C. Kaptein, D. Van Bel, B. de Ruyter B., P. Markopoulos and E. Aarts , “Social connectedness and compliance’’*, CHI Workshop on Social Connectedness*, 2010

[18] B.E. Moely, S.H. Mercer, V. Illustre, D. Miron and M. McFarland, “Psychometric properties and correlates of the Civic Attitudes and Skills Questionnaire (CASQ): A measure of students’ attitudes related to service-learning”, *Michigan Journal of Community Service Learning*, vol. 8, pp. 15-26, 2002

[19] M. Choi and W.E.A. Ruona, “Individual readiness for organizational change and its implications for human resource and organization development”, *Human Resource Development Review,* vol. 10, no.1, pp. 46-73, 2011

[20] M. Kaptein, P. Markopoulos, B. de Ruyter and E. Aarts, " Two acts of social intelligence: the effects of mimicry and social praise on the evaluation of an artificial agent”, *AI & Soc*, vol. 26, pp. 261-273, 2011

[21] A.K. Cohen and B.W. Chaffee, “The relationship between adolescents’ civic knowledge, civic attitude, and civic behavior and their self-reported future likelihood of voting”, *Educ Citizsh Soc Justice,* vol. 8, no. 1, pp. 43-57, March, 2013

[22] M. Diehl, A.B. Semegon, and R. Schwarzer, “Assessing attention control in goal pursuit: A component of dispositional self-regulation”, *Journal of Personality Assessment*, vol. 86, no. 3, pp. 306-317, June, 2006

[23] I. Roll, V. Aleven, B.M. McLaren and K.R. Koedinger, “Metacognitive practice makes perfect: Improving students’ self-assessment skills with an intelligent tutoring system”, in Biswas et al. (Eds.), *AIED 2011*, LNAI 6738, pp. 288-295, 2011

[24] Pascarella, E. T., Ethington, C. A., & Smart, J. C. The influence of college on humanitarian/civic involvement values. *Journal of Higher Education*, 59, 412-437 (1988)

[25] D.E. Giles and J. Eyler, “The impact of a college community service laboratory on students’ personal, social and cognitive outcomes”, *Journal of Adolescence*, vol. 17, pp. 327-339, 1994

[26] P. K. C. Low and S.L. Ang, “Information Communication Technology (ICT) for Negotiations”, *Journal of Research in International Business and Management*, vol. 1, no. 6, pp. 183-196, 2011

[27] R. Agarwal, S. Viswanathan and A. Animesh, “The “new” world of negotiations: Interactions mediated by information technology”, in B.M. Goldman and D.L. Shapiro (Eds.), *The Psychology of Negotiations in the 21st Century Workplace. New challenges and New Solutions*, chapter 14, pp. 399-440), Taylor & Francis Group, New York, 2012

[28] S. Kraus, “Negotiation and cooperation in multi-agent environments”, *Artificial Intelligence*, vol. 94, pp. 79-97, 1997

[29] R. Lin and S. Kraus, “Can automated agents proficiently negotiate with humans?”, *Communications of the ACM*, vol. 53, no. 1, pp. 79-88, January, 2010

[30] Y. Gal, S. Kraus, M. Gelfand, H. Khashan and E. Salmon, “An adaptive agent for negotiating with people in different cultures”, *ACM Transactions on Intelligent Systems and Technology*, vol. 3, no. 1, issue 8, pp. 1-24, 2011