An application of Systems Inquiry for preventing dropout in a particular context of adult education

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ABSTRACT
Students that attend evening high-schools in Greece are mainly adults that missed the opportunity of graduating during their adolescence. They can be working-persons that belong to vulnerable social groups, from areas with intense social problems. The additional burden of studies in their daily workload may discourage them from completing their second-chance education. To prevent dropout, intervention projects have to be planned and implemented by the local educational authorities. Systems Inquiry is a comprehensive conceptual framework of Systems Science, which provides planning tools that may successfully assist the educational authorities in conducting relevant intervention projects.

KEYWORDS
Systems Inquiry, systemic methodology, adult education, dropout

RÉSUMÉ
Les élèves qui fréquentent une école du soir en Grèce, sont principalement des adultes ayant raté l'occasion d'acquérir (obtenir) un diplôme au cours de leur adolescence. Ils peuvent être des travailleurs de milieux défavorisés, de zones ayant de problèmes sociaux aigus. Le fardeau supplémentaire des études dans leur charge de travail quotidienne peut les décourager de terminer leurs études de deuxième chance. La lutte de prévention contre le décrochage doit être basée sur les programmes d'intervention conçus et mis en oeuvre par les autorités éducatives locales. L'élaboration des systèmes constitue un cadre conceptuel complet des sciences des systèmes, fournissant des outils de planification afin de bien mener les projets d'intervention par les autorités éducatives.

MOTS-CLÉS
Enquête sur les systèmes, méthodologie systémique, éducation des adultes, décrochage scolaire

INTRODUCTION

In an Evening High-Scholl of the Greek secondary education, students regardless of their age are able to complete their studies and to continue further, if they wish. Evening High-Schools are attended by working persons; mainly adults that during their adolescence didn't have the opportunity to complete their secondary education studies. Depending on the context, the completion of their studies can be very difficult, despite this second chance that is given to them. Such a typical context can be found in a particular evening school of the educational region of West Attica (Greece), where both advantages and disadvantages are present. The advantageous conditions include that the school authorities adopt a flexible system, whereby limits are set, knowing how to determine its specific identity and be protected from unwarranted intrusion. The teaching staff has long experience in teaching adults and vulnerable groups, being also aware of avoiding any kind of discrimination, including gender or racial one.

Nevertheless, the disadvantages are also significant. The phenomenon of heterogeneity is observed in the classrooms, since the students are neither persons of the same age group, nor in the same stage of development (Polson, 1993). The school suffers from insufficient funding, since only the basic operating cost is covered. It is located in an area with high unemployment rates and criminality, acute delinquency, particularly during the evening hours, and a lack of cooperation between the teachers and the relatives of the female students. Other related aspects of the problem is the low performance of students, low self-esteem, lack of goals for the continuation of their study, much of truancy and more general obstacles in the learning process. Especially female students have to deal with cumulative family and economic problems, such as child care, inadequate income, multiple roles within their family and lack of time (Papaioannou, 2014). They are also affected by a poor performance of expression in written and spoken language, mainly those women who are married and mothers, foreign or part-time workers.

Consequently, under such conditions, the danger of dropout is high. Therefore, it is necessary that appropriate measures should be taken, because the students are hardly able to graduate from school. For their overall assistance towards graduation, a supportive plan has been studied and proposed, based on Systems Inquiry and modified from similar cases (Papakitsos et al., 2017b).

SYSTEMS INQUIRY

A *system* can be described as a complex set of components, along with their properties, relationships and processes. These components may interact both with each other and with their environment. Every phenomenon is considered as a system, described by an equivalent mathematical model (Papakitsos & Katsigiannis, 2015, p. 25). The concept conventionally originates from the work of Bertalanffy (1968). One of the most comprehensive conceptual frameworks for studying systems is Systems Inquiry (Banathy, 1997). It comprises three domains of study: Systems Philosophy, Systems Theory and Systems Methodology (Banathy & Jenlink, 2001, p. 37).

Systems Philosophy concerns the general issues of applying systems thinking in the study of theoretical and real-world problems alike. Systems Theory investigates the principles and the description models of the abstract organization of phenomena, in an interdisciplinary manner, independently of their nature or scale of existence (Heylighen & Joslyn, 1992). According to Stichweh (2011), two variants of Systems Theory can be defined:

- The General Systems Theory (GST) that concerns natural systems, being popular among physicists, chemists, biologists and mathematicians. It is also related with Cybernetics, as defined by Wiener (1948).
- The study of social systems (Parsons, 1977; Luhmann, 1995), as a sociological paradigm, where GST was applied to human activity systems, because "… social and psychological phenomena tend to resist quantitative modelling by posing basic difficulties already on the plane of boundary identification …" (Laszlo & Krippner, 1998). They are also adaptive systems that may change their behaviour through feedback (Stichweh, 2011), as they learn from experience. This particular variant includes the human learning processes (Banathy & Jenlink, 2001, p. 47-49), therefore education (Banathy, 1991; Betts, 1992). The adaptive systems are self-regulating and can be both social and natural.

The last domain is Systems Methodology. It considers the methods of generating knowledge about systems in general and the discovery of strategies, methods, models and tools for studying complex systems (Banathy & Jenlink, 2001, p. 40). Systems Methodology includes a variety of conceptual tools, like cognitive maps, which may provide a conceptual representation of a particular social environment, in the form of a model (Laszlo et al., 1993). The most fundamental model is the Generic Systems Model (GSM) that consists of the looping quadruplet (Sanders, 1991):

[input] > [process] > [output] (> [feedback]).

Such a conceptual tool for conducting systemic modelling is the Organizational Method for Analyzing Systems (OMAS), presented in the next section.

SYSTEMIC MODELLING

OMAS is a systemic modelling tool that was introduced in 2010 (Papakitsos, 2010), with a revision (OMAS-II) released in 2011 (Papakitsos, 2011) and the current version (OMAS-III) developed in 2013 (Papakitsos, 2013a, p. 178-185; 2013b). It is derived from standard earlier techniques of Information Systems: the Structure Analysis and Design Technique (Ross, 1977) and the Integration Definition for Function Modelling series of models (Grover & Kettinger, 2000). Both of them are designed according to GSM. The evolutionary process of OMAS aimed at increasing the compatibility of them to similar models that describe the process of human communication (Lasswell, 1991; Mantoglou, 2007), thus improving its understandability and usability in social systems.

Especially in educational applications, OMAS has been used for:

- language teaching (Makrygiannis & Papakitsos, 2015);
- designing curricula and projects of career guidance (Papakitsos et al., 2015);
- developing teachers extracurricular training (Foulidi et al., 2016);
- designing educational websites (Papakitsos et al., 2016a);
- relating labour market to vocational education (Papakitsos, 2016a);
- developing curricula in higher education (Papakitsos, 2016b);
- conflict management in school context through peer mediation (Papakitsos & Karakiozis, 2016);

- devising inclusive education policies in areas with acute social problems (Papakitsos et al., 2017b);
- planning in local educational administration (Papakitsos et al., 2017a).

According to OMAS, the analysis of any system is based on the seven so called "journalist's questions" that conventionally correspond to equivalent aspects of the system:

- *Why* (causality aspects): the purpose of the system;
- *What* (Output): the observed goals/results of the system, either expected/desired or not, including feedback that may affect more aspects than merely Input (next);
- *Which* (Input): refers to quantitative information, including resources, data, funds, primary material and manpower entering the system;
- *How* (ruling aspects): legislation, conditions and regulations, social or natural, that dictate the operation of the system;
- *Where* (spatial aspects): natural/virtual places;
- *When* (temporal aspects): relevant/absolute time and scheduling;
- *Who* (Monitor): persons that operate in a managerial manner.

Thereby, the application of Systems Inquiry is conducted in a natural communicational manner. The various aspects can be related, while the boundaries of a system are defined according to whether these aspects are integral parts of it or not. For example, if the regulations of an educational institute are merely internal ones, then this aspect is an integral part of this system. If they are dictated though by national legislation, then this aspect is a functional part, beyond its boundaries. If every part of the system is not integral, then the system is open. The implementation of this systemic methodology will be demonstrated next, for planning an intervention that may prevent dropout in the afore-mentioned context of adult education.

PLANNING A SYSTEMIC INTERVENTION

The demonstration commences by stating the causality aspects ("Why") of the system, as previously mentioned in the introductory section. A school is considered to be an open social system (Getzels & Guba, 1957). To prevent the dropout of adult students that cope with difficult social conditions is a major contribution to their future welfare. Therefore, the planning of the necessary activities is presented according to the classification of the relevant aspects of OMAS.

Defining the Output ("What")

[i] Diagnosis of the problem (students who need support and to what extent).
[ii] To record and document the activities of the intervention, including a folder created, which will incorporate all the group projects that the students have edited (*portfolio*).
[iii] To strengthen the self-esteem of students.
[iv] To develop learning motivation and improve the performance of students by at least 15% on average.
[v] Especially for female students, to develop the awareness of the entire school community about the position of women in society, the need for redistribution of family roles and equal presence in the workplace and in decision-making.

[vi] To conduct an internal evaluation at the end of the semester. It will be a formative assessment (Black & William, 1998) that operates as a feedback mechanism for the identification and correction of any deficiencies.

[vii] To publicize the results of the intervention in the school and local community.

Acquiring the Input ("Which")

- The target group of the intervention [i].
- The specialized teaching manual, referring to career guidance and counseling (Chatzi & Chatzistamatiou, 2007) for investigating professional interests, professional values and business decisions of students [iii, iv].
- The specialized manuals (Ziogou-Karastergiou, 2008) for gender studies [v].
- To complete the intervention, the required supplies (mainly ink-cartridges and paper for printers) will have to be purchased. The small procurement cost can be covered by the school-management committee or by other ways of school-funding (Papakitsos et al., 2016b).

Ruling Aspects ("How")

[viii] The entire intervention can be conducted as a standard extracurricular project of the Greek educational system (Papakitsos et al., 2017b, p. 6-7), having some administrative advantages. This process may include the training of the teaching staff in conducting such projects (Karakiozis et al., 2016; Foulidi et al., 2016).

[ix] For the diagnosis of the target group [i], the students need to fill in an anonymous questionnaire that will be created for this purpose.

[x] Specially designed questionnaires, according to holistic assessment models (Rogers, 1999; Mavrogiorgos, 2006), will provide answers to whether the objectives and results have been achieved and what is the sustainability of this intervention project [vi].

[xi] The school may participate in ASPNET Network of UNESCO Associated Schools, generally aiming to achieve the ideals of UNESCO and particularly of lifelong learning for socially vulnerable groups (UNESCO-IBE, 2008).

[xii] Special care should be taken for dealing with actions and mentalities that may undermine the completion of the intervention project. Indicatively, the project may be negatively addressed by some teachers, because of a mentality dominated by the fear of the unknown (Everard & Morris, 1999, p. 259-260) or because they may consider that their labour-rights are threatened due to additional work that will be required.

Spatial Aspects ("Where")

Considering the general conditions (evening school hours, working students), the intervention will take place exclusively within the installations of the school; normally in classroom, but occasionally in the computer laboratory as well [xi].

Temporal Aspects ("When")

[xiii] The intervention will take place during the second semester, for administrative reasons that have to do with the required preparation time. At this stage, difficulties may arise that are related to the workload of teachers, which may cause their desire not to get involved in the intervention or to give up.

[xiv] The implementation will be conducted in three major phases: the preparation ([i], *Acquiring the Input*, [viii-ix, xi-xii]), the realization [ii-v] and the evaluation [vi, vii, x].

[xv] It is estimated that the preparation phase will take 10 work-hours, the realization 100 work-hours and the evaluation 20 work-hours [xiv].

Monitoring ("Who")

The activities of the intervention are monitored by the teaching staff and experts of the regional educational administration, according to their specialty and specific roles:

- During the diagnostic process [i], the ITC teachers will initially calculate the average of students' scores of the first semester by gender and will compare the scores of female students who attend school in the last five years.
- The qualitative and quantitative analysis, and the reporting of the diagnosis' results will take place by the experienced team of teachers in educational research. The results will be interpreted by the teachers' council and the regional experts (next).
- The regional Pedagogical Counselor and the regional supervisors of Cultural Affairs, Health Education, Vocational Guidance and Counseling will assist: with the interpretation of the diagnosis [i]; with the preparatory training of teachers [viii] for teaching methods that favor the development of learning motivation (Androusou, 2007) and for avoiding the phenomenon of self-fulfilling prophecy, by sensitizing them about their expectations and their personal attitudes towards people from specific vulnerable groups (Athanasiou et al., 2014); with the designing of the various questionnaires [ix, x]; with specific issues of their respective expertise [ii-vii, xii], like gender studies, career guidance and counseling.
- At the beginning of the second semester, the teachers of foreign languages will be responsible for conducting the participation of school in ASPNET Network of UNESCO Associated Schools [xi].
- For the achievement of the projects goals [i-vii], all the involved teachers will agree on applying new teaching methods and pedagogical principles. The effort will be focused on the third (and final) grade. Among the expected benefits are the overcoming of gender stereotypes and the changing of attitudes and behavior about occupational stereotypes [v].
- Teachers, who might have worked in another evening school the previous year, will undertake the creation of partnership between the two schools, with common objectives, since the benefits of interschool cooperation are remarkable (Burns, 2003).
- The teacher who is experienced in implementing Health Education projects will undertake a minor intervention in empowerment of female students [iii, v] by utilizing the manuals mentioned at the Input ("Which") subsection. The teacher who has realized cultural projects can assist them in improving their expression and speech production [iv].
- During the second semester, psychologists of the social service of the local municipality may hold individual sessions with all students and members of their family, who wish to have psychosocial support [iii, v].
- A group of teachers with experience in operations assessment will undertake the interpretation, statistical processing, and formulation of specific proposals for the future improvement of the intervention project [ii, vi, x].
- At the end of the semester (and of the intervention project), the group of philology teachers will edit and publicize the results of the project on the school's website and will inform about: the local educational Directorate, the school community and the local community through a relevant press release [vii].

Last but not least is the crucial role of the school Director, who is responsible for coordinating the entire intervention project. He/she will have to study the environmental constraints, the contemporary social and economic problems that affect the operation of the school, the available human and financial resources, the existing equipment and materials, the objectives and mission of the school (Pasiardis, 2004; Athanasoula-Reppa, 2008). Finally, he/she will have to overcome all the difficulties that may arise [xii], by encouraging the involved teachers and illustrating the necessity of the intervention for the benefit of their students.

CONCLUSIONS

To summarize the presented work, it has been demonstrated how Systems Inquiry may facilitate the planning of intervention projects that may deal with the dropout of adult students of secondary education, in areas having intense social problems. These students missed the opportunity of graduating high-school during their adolescence and may belong to especially vulnerable groups, like working women. Attending evening high-schools can be an additional burden in their daily workload that may discourage them from completing their second-chance studies. The tools of systemic methodology may provide comprehensive means of studying the associated problems in a holistic manner, by determining all the involved factors, as well as plan and implement the supportive activities that will assist the students in their graduation and their future welfare.

REFERENCES

Androusou, A. (2007). *Teaching Methodology - Motivation in Education - Education of Muslims, keys and passkeys*. Athens: Ministry of Education & University of Athens (in Greek).

Athanasiou, A., Balntoukas, A., & Panaoura, R. (2014). *Handbook for adult educators, basic teaching principles of adults belonging to vulnerable groups of population*. Nicosia: Frederick University (in Greek).

Athanasoula-Reppa, A. (2008). *Educational administration and organizational behavior: the pedagogy of educational administration*. Athens: Ellin (in Greek).

Banathy, B. H. (1991). *Systems design of education: a journey to create the future*. Englewood Cliffs, N.J.: Educational Technology Publications.

Banathy, B. H. (1997). The evolution of systems inquiry. *Systems*, *2*(1), Techn. Univ. Wroclaw, Poland.

Banathy, B. H., & Jenlink, P. M. (2001). Systems inquiry and its application in education. In D. H. Jonassen & J. C. Belland (Eds), *Handbook of research for educational communications and technology: I - foundations for research in educational communications and technology*. Bloomington, IN: Association for Educational Communications and Technology. Retrieved from http://www.aect.org/edtech/ed1/.

Bertalanffy, L. von (1968). *General system theory: essays on its foundation and development*. New York: George Braziller.

Betts, F. (1992). How systems thinking applies to education. *Improving School Quality, 50*(3), 38-41.

Black, P., & William, D (1998). Assessment and classroom learning. *Assessment in Education, 5*(1), 7-71.

Burns, M. (2003). *Practitioner perspectives on successful whole school innovation, collaboration and leadership*. London: Innovation Unit.

Chatzi, S., & Chatzistamatiou, M. (2007). *Psychometric tools - Career guidance test: Manual*. Athens: Pedagogical Institute (in Greek). Retrieved from http://www.eoppep.gr/teens/ index.php/tests.

Everard, K. B., & Morris, G. (1999). *Effective Educational Management*. Patras: Greek Open University (in Greek).

Foulidi, X., Papakitsos, E. C., Karakiozis, K., Papapanousi, C., Theologis, E., & Argyriou, A. (2016). Systemic methodology for developing teachers extracurricular training. *Journal of Educational Leadership and Policy*, *1*(2), 36-42.

Getzels, J., & Guba, E. (1957). Social behavior and die administrative process. *The School Review*, *65*(4), 423-441.

Grover, V., & Kettinger, W. J. (2000). *Process think: winning perspectives for business change in the information age*. IGI Global, DOI: 10.4018/978-1-878289-68-1.

Heylighen, F., & Joslyn, C. (1992). Systems theory. In F. Heylighen, C. Joslyn & V. Turchin (Eds), *Principia Cybernetica Web*. Brussels: Principia Cybernetica. Retrieved from http://pespmc1.vub.ac.be/systheor.html.

Karakiozis, K., Foulidi, X., Papakitsos, E. C., Papapanousi, C., Theologis, E., & Argyriou, A. (2016). Detection of the training needs for the teachers of West Attica Secondary Education Directorate within the implementation framework of extracurricular projects. *Erkyna, Review of Educational – Scientific Topics*, *11*, 157-171 (in Greek).

Lasswell, D. H. (1991). The structure and function of communication in society. In K. Livieratos & T. Fragkoulis (Eds), *The message of medium. The explosion of massive communication* (pp. 65-83). Athens: Alexandria (in Greek).

Laszlo, E., & Masulli, I. (1993) with Artigiani, R., & Csányi, V. (Eds.). *The evolution of cognitive maps: new paradigms for the twenty-first century*. New York: Gordon & Breach.

Laszlo, A., & Krippner, S. (1998). Systems theories: their origins, foundations, and development. In J. S. Jordan (Ed.), *Systems theories and a priori aspects of perception* (Ch. 3, pp. 47-74). Amsterdam: Elsevier Science.

Luhmann, N. (1995). *Social Systems*. Stanford, CA: Stanford U.P.

Makrygiannis, P. S., & Papakitsos, E. C. (2015). Writing or programming an essay? An interdisciplinary systemic experiment in language teaching. *Journal of Global Research in Education and Social Science*, *4*(1), 16-24.

Mantoglou, A. (2007). Models, basic principles and skills of communication. In C. Kapoli (Ed.), *Counselling horizons for school guidance - SOS orientation* (pp. 508-530). Athens: Panteion University of Social and Political Sciences (in Greek).

Mavrogiorgos, G. (2006). *Evaluation of educational work. Instructors training program, Volume III*. Athens: EKEPIS (in Greek).

Papaioannou, E. (2014). *The empowerment of vulnerable adults through education. Training of adult trainers that teach in vulnerable groups of population*. Revised European Agenda for Adult Education (2012-2014), Cyprus. Retrieved from http://www.moec.gov.cy/aethee/ omadiki_mathisi/fev_2014/6_endynamosi_evaloton_enilikon_eleni_papaioannou.pdf (in Greek).

Papakitsos, E. (2010). *Organizational method of analysing systems*. Athens: Thessalou (in Greek).

Papakitsos, E. C. (2011). *Basic meanings of linguistic computing*. Athens: Thessalou (in Greek).

Papakitsos, E. (2013a). The systemic modeling via military practice at the service of any operational planning. *International Journal of Academic Research in Business and Social Science, 3*(9), 176-190.

Papakitsos, E. C. (2013b). *Linguistic software engineering: I. Preparation*. Athens: National Library of Greece (in Greek).

Papakitsos, E. C. (2016a). Systemic modelling for relating labour market to vocational education. *International Journal for Research in Vocational Education and Training, 3*(3), 166-184.

Papakitsos, E. C. (2016b). The application of systems methodology to curriculum development in Higher Education. *Higher Education Research, 1*(1), 1-9.

Papakitsos, E. C., & Katsigiannis, S. V. (2015). An application of systems theory to the perception of combat in martial arts. *International Journal of Martial Arts, 1*, 25-34.

Papakitsos, E. C., Makrygiannis, P. S., & Tseles, D. I. (2015). Modelling the application of blended-learning in career guidance projects of the Hellenic Secondary Education. Paper presented at International Scientific Conference eRA–10: The SynEnergy Forum, Piraeus University of Applied Sciences, Aigaleo, Greece, 23rd-25th of September 2015.

Papakitsos, E. C., & Karakiozis, K. (2016). Conflict management via systemically planned peer mediation. *European Journal of Alternative Education Studies, 1*(2), 68-84.

Papakitsos, E. C., Chatzistratidi, F., Makrygiannis, P. S., & Kardara, M. (2016a). The application of communication criteria in designing educational websites. In *Proceedings of the 8th Conference Informatics in Education* (pp. 392-401). Greece: Piraeus University (in Greek).

Papakitsos, E. C., Foulidi, X., Karakiozis, K., Theologis, E., & Argyriou, A. (2016b). Alternative Funding of Schools in Europe. *European Journal of Education Studies, 2*(7), 1-9.

Papakitsos, E. C., Foulidi, X., Vartelatou, S., & Karakiozis, K. (2017a). The contribution of Systems Science to planning in local educational administration. *European Journal of Education Studies, 3*(3), 1-11.

Papakitsos, E. C., Karakiozis, K., & Foulidi, X. (2017b). Systemic methodology for inclusive education policies in areas with acute social problems. *European Journal of Alternative Education Studies, 2*(1), 32-47.

Parsons, T. (1977). *Social systems and the evolution of Action Theory*. New York: Free Press.

Pasiardis, P. (2004). *Educational Leadership: from the period of benign indifference to modern times*. Athens: Metaichmio (in Greek).

Polson, C. J. (1993). *Teaching adult students*. IDEA Paper No. 29. Kansas State University: Center for Faculty Evaluation and Development.

Rogers, A. (1999). *Adult Education*. Athens: Metaichmio, (in Greek).

Ross, D. T. (1977). Structured Analysis: a language for communicating ideas. *IEEE Trans. Software Engineering, January 1977*, 16-34.

Sanders, M. (1991). *Communication technology today and tomorrow*. USA: Glencoe - McGraw-Hill.

Stichweh, R. (2011). Systems Theory. In B. Badie et al. (Eds), *International Encyclopedia of Political Science*. New York: Sage.

UNESCO-IBE (2008). *Conclusions and Recommendations of the 48th Session of the International Conference on Education* (ED/BIE/CONFINTED 48/5). Geneva: UNESCO-IBE.

Wiener, N. (1948). *Cybernetics: or control and communication in the animal and the machine*. Cambridge, MA: MIT-Press.

Ziogou-Karastergiou, S. (Ed.) (2008). *Awareness exercises of students in vocational guidance with gender perspective*. Thessaloniki: Aristotle University of Thessaloniki (in Greek).