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2. THE CHALLENGE METHODOLOGY. A CASE STUDY TO ENHANCE DIGITAL COMPETENCES FOR TEACHERS

di Maria Chiara De Angelis*

Abstract: *The essay shows a reflection about a wider case study aimed to enhance digital skills for teachers. The training model was designed on the basis of the results of the analysis of training needs that was carried out within the DECODE project. Among its activities, this project included the distribution of an online questionnaire, involving more than 2000 teachers from Italy, Spain, Romania, Finland, and the United Kingdom. The purpose of the online training path taken into account in this essay was to guide teachers in the process of empowerment of digital skills, by focusing on the methodological and relational dimension, considered strategic in the learning-teaching processes. Through a Moodle environment has been built a space for discussion and work based on teaching practice, with the aim of increasing digital competences, share best practices and promote a reflexive space of discussion.*

Keywords: online-learning, digital skills, teachers' training, innovation training models, learning methodology.

Abstract: *Il saggio illustra gli esiti di un caso di studio realizzato all'interno di un più ampio progetto volto a migliorare le competenze*

* Link Campus University.

digitali degli insegnanti. Il modello formativo è stato progettato sulla base dei risultati dell'analisi dei fabbisogni formativi svolta nell'ambito del progetto DECODE. Tra le sue attività, questo progetto includeva la distribuzione di un questionario online, coinvolgendo più di 2000 insegnanti provenienti da Italia, Spagna, Romania, Finlandia e Regno Unito. Lo scopo del percorso formativo online è stato quello di guidare i docenti nel processo di empowerment delle competenze digitali. Nella presentazione di questo estratto di ricerca ci si focalizza sulla dimensione metodologica e relazionale, ritenuta strategica nei processi di apprendimento-insegnamento. Il percorso di formazione di cui si dà conto è stato realizzato attraverso un ambiente di apprendimento online (Moodle) con l'intento di creare uno spazio di discussione e lavoro basato sulla pratica didattica, con l'obiettivo di aumentare le competenze digitali, condividere le migliori pratiche e promuovere uno spazio riflessivo di discussione.

Parole chiave: apprendimento online, competenze digitali, formazione docenti, innovazione dei percorsi formativi, metodologie di apprendimento.

Introduction

Digital competences in the knowledge society are considered strategic in facing contemporary challenges and developing an innovative and inclusive education system.

In the European framework 'Key Competences for Lifelong Learning' updated in 2018 (2018/C 189/01), the European institutions stress the need for citizens to develop lifelong attitudes and skills to enable them to participate actively in social life and to meet the needs of a changing labour market. In particular, the emphasis is placed on the need to fully understand the

opportunities and challenges related to new technologies and the ongoing digital revolution. Digital technologies also represent a key resource for people working in education: in the context of formal education, ICT can be used through new pedagogical methods for teaching, the so-called soft skills, such as problem-solving and empathic thinking (OECD, 2018).

The DECODE[1] Project - "Develop Competence in Digital Era" (www.decode-net.eu), funded by the Erasmus+ Programme of the European Union, in the framework of KA2 - Strategic Partnerships in Education and Training (2016-2019), was born from the belief that it is possible to accompany the school's professionalism in relation to the use of the digital in teaching practices only starting from the analysis of the state of the art of digital innovation.

This innovation participates in the development of a new and innovative approach to the use of digital technology in education and training, contributing to the construction of that "organizational plot" that is given by the set of people, practices, technologies, emotions and rituals through which participants create and share knowledge every day (Cooper & Fox, 1990; Gherardi, 2006).

To this end, after the first phase of scouting and qualitative research that involved policymakers, school leaders and Education System professionals, an online survey was conducted involving more than 2000 teachers. The survey is an exploratory research, with no claim of statistical representation. This survey aimed at reconstructing the role assumed by digital technologies in teaching

[1] The essay is part of a wider research path "DECODE – Develop Competences in digital era" carried out within the Erasmus+ Programme of the European Union, in the framework of KA2-Strategic Partnerships in Education and Training (2016-2019) and focuses specifically on the outcomes of the training action designed by the team of the Open University of Catalonia, leader partner of the Intellectual Output 5 The training model to improve teachers competence in the Digital Era: http://decode-net.eu/wp-content/uploads/2019/09/IO5_Final-report.pdf

practices and the self-perceived level of competence of teachers, through the application of the European Framework of Digital Teaching Competences of Educators (Redecker & Punie, 2017) and the Catalan reference framework "Digital Teaching Competence" (DTC), (Gisbert & Lázaro, 2015; Krumsvik, 2014a).

Subsequently, the Open University of Catalonia (UOC) conducted a comparative analysis of the two reference frameworks, elaborating a proposal aimed at enucleating dimensions and descriptors of teachers' digital skills. The outcome of this work represented the necessary information background for the design of the experimental training path, realized through the Moodle learning environment of Link Campus University.

The proposed model focuses specifically on the definition of Teachers' Digital Competences adopted by Catalonia, based on the distinction between instrumental and methodological competence of the teachers, and on the definition of the latter as "the ability of teachers to move and transfer all their knowledge, strategies, skills and attitudes regarding Learning and Knowledge Technologies (TAC) in real and concrete situations of their professional practice.

The aim of this is to: (a) facilitate students' learning and to develop their digital competences; (b) implement processes of improvement and innovation in education according to the needs of the digital age; (c) contribute to their professional development in accordance with the transformation processes taking place in modern society and school" (Generalitat de Catalunya, 2018: 11).

This definition classifies DTC (Digital Teachers' Competences) into 5 dimensions (Table 1):

1. educational design, planning, and implementation;
2. management of educational spaces and resources;
3. communication and collaboration;
4. ethics and digital citizenship;
5. professional development.

Table 1 - Dimensions and descriptors of the TDC for the development of the online training

DTC Dimensions	**Dimensions description**
1. Design of training interventions (methodology, activities, resources, and evaluation) through the use of digital technologies.	1.1 Incorporation of students' digital competencies into educational activity; 1.2 Use of digital technologies in the development of activities or learning environments; 1.3 Definition of the monitoring strategy and methodology for evaluating students in the teaching-learning process (self-evaluation and co-evaluation); 1.4 Critical research and selection of digital resources appropriate to the context and specific learning objectives; 1.5 Application of innovative methodologies using digital technologies.
2. Organization and management of information, resources and digital environments	2.1. Appropriate application of the rules of digital environments and spaces (appropriate content, language, correct management of digital spaces); 2.2. Optimization of digital information management.

3. Communication and collaboration through digital technologies	3.1. Use of digital technologies to communicate with colleagues; 3.2. Participation in educational networks in digital environments; 3.3. Promotion of joint knowledge building based on digital technologies
4. Ethics and citizenship	4.1. Respect for permits in the use of digital resources; 4.2. Awareness and presence of your digital identity in all network interactions.
5. Professional development	5.1. Reflective practice on professional activity using digital technologies; 5.2. Professional digital profile active in different networks and internally in the Moodle context.

Source: DECODE Project

1. *The moodle pilot experimentation*

The purpose of the online training course was to guide teachers in the process of empowerment of digital competences according to the above-mentioned competences described in the DTC framework.

The Moodle environment has been used to build a space for reflection and work based on teaching practice, with the aim of increasing digital competences.

The choice of Moodle as a delivery platform is due to three main reasons:

a) the possibility offered by Moodle to create a user-friendly and intuitive learning environment that can be easily used by teachers with different levels of competence for the use of a Learning Management System (LMS,) and to be able to structure it in an incremental and gradual way, designing the path according to the peculiarities of the national contexts of application;

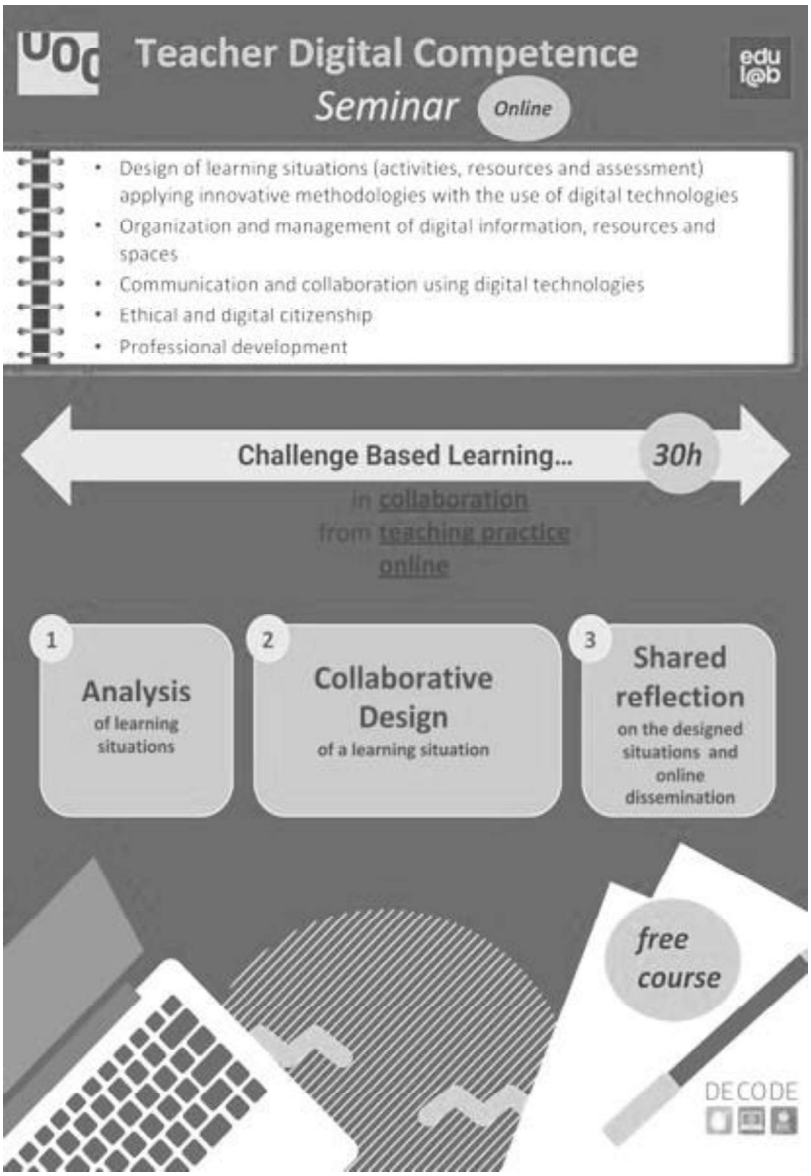
b) the consolidated use of Moodle among the project partners, in their respective organizations, to guarantee simple/ smart management of the training program and its sustainability;

c) the opportunity to easily improve, integrate and replicate the training intervention thanks to the versatility of the Moodle online learning environment.

Although the experimentation of the training course involves the use of digital tools, it mainly focuses on the development of teachers' digital methodological skills.

The seminar (Figure 1) was designed using the Challenge Base Learning (CBL) methodology (Fidalgo Blanco, Sein-Echaluce Lacleta & García Peñalvo, 2017; Johnson, Smith, Smythe & Varon, 2009), involving participants in the three-step design of a learning situation aimed at promoting students' digital competence.

Figure 1: Seminar Teacher Digital Competence



Source: DECODE Project

The CBL methodology is characterized by three interconnected phases: involving, investigating and acting. Each phase includes activities that prepare learners to move on to the next phase. Each of the individual phases can also be structured in mini-cycles of investigation, with the possibility to return to the

previous step. A constant process of documentation, reflection, and sharing support the whole cognitive process. Challenge-based learning engages participants in defining a solution to a real problem related to their own context. In the case of the pilot seminar of the DECODE project[2], the context is the teaching practice of the participants and has been structured by involving the teachers in the collaborative design of a learning situation.

Participants carried out cooperative work in small groups in order to achieve three main tasks.

1. Definition of a learning situation: the learning situation is meant as a concrete situation and a motivating challenge that can be addressed by mobilizing functional knowledge and skills, successfully solving the delivery and developing competences (Perrenoud, 2012).
2. Designing the learning situation to be realized in a team.
3. Assessment of the peer learning situation and online dissemination of the redesigned learning situation.

All the different phases of the training promoted peer sharing through teamwork and online distribution of the redesigned learning situation. The whole learning path has been backed up by Open Educational Resources (OER), organized on the basis of a precise training path in line with the DTC framework.

Each project partner replicated the structure of the training path, gradually adapting it to the needs of the specific national context in which it was delivered.

The Moodle platform allowed to articulate the three challenges into three macro sections and relative subsections, where participants of the online course were able to follow the deliveries and to experience the integration of two teaching models: distributive didactic (DD) and interactive didactic (ID).

[2] For the overall project results see Capogna S. *et. al.*, 2020.

Distributive didactic (DD) refers to the autonomous use by students of didactic material to support their studies (video-pills, manuals, slides, handouts, and other digital resources). DD mainly employs transmissive activities, in which the e-contents must be prepared by teachers and/or tutors, in a comprehensive and easy to understand way, for different types of students. In DD the interaction is between student/teaching materials and the use of e-contents, when requested by the student, can be mediated by tutors/teachers.

Interactive didactic (ID) refers to all activities of active, participatory, and collaborative didactic. In this case, the interaction is no longer between student/didactic materials but between student/teacher and/or tutor. In particular, interactive didactic is characterized by training activities during which the student actively participates in learning situations organized by the teacher/tutor. Teachers and tutors can organize different activities to encourage the participation of students, for example:

- creation of forum discussions (on the model of learning cooperation);
- creation of wikis;
- chat tutoring (saving and redistribution of chat content);
- exercises, creation of case studies, project work and exam simulations.

All these activities were tested by tutors operating in a ratio of 1 to 50 (max).

In the DECODE training course on Moodle, the resources provided included presentations and pdf documents inserted through file resources, multimedia slides, links to sites and audio/video resources of interest and for in-depth studies. For the organization of collaboration and communication activities, discussion forums and Messages function were mainly used, while

for the delivery of individual and group products, the course participants were directed to the use of the "task activity module".

The learning environment, structured in this way, has placed a strong emphasis on the teacher undergoing training and on the self-determination of the training path as well as on the objectives identified by it, forming a set of stimulus-opportunities accompanying the learning experience. Despite the variety of resources and activities offered by Moodle LMS, it was decided to invest in the use of forums (general and group), enhancing the contemplative momentum and cooperative collaboration within the whole learning community. This methodological choice required a strong investment in tutoring and facilitation during the proposed path, with the aim of ensuring a virtuous interaction between learners and the learning system constituted by the axis: people (teachers, tutors, other students, help desk); knowledge (content, exercises, simulations, tests, challenges, etc.); and technologies (technological infrastructure, multimedia supports, applications, etc.). Therefore, the role of the teacher/tutor as an activator and facilitator of the learning process of the course participants was central, especially during the initial phase of the course, when it was necessary to motivate and to engage participants and activate the working groups.

The assessment of the training was based on the logic of continuous evaluation, considering the centrality of the reflective and dialogical dimension in the learning process; consequently, the teachers involved participated in self-evaluation and co-evaluation activities throughout the training process. Also, the evaluation was prepared using group forums as a space for restitution/reflection of what was produced in the working groups. Only in the case of the final evaluation of the re-designed learning situations, participants were directed through a link to a specifically prepared Google Form.

The adopted pedagogical didactic model is based on the value of interaction (of teachers, tutors, and students), with the learning contents and with the set of inputs and opportunities that can come from a learning community sharing a path. In this sense, the online learning environment has been distinguished as the place where students, teachers, technicians and experts meet to collaborate and interact for problem-solving, participating in development projects, the joint creation of products and projects, discussing, researching and scouting of ideas.

1.1 *Implementation of the online path in national contexts*

The main goal of the offered training was to encourage critical thinking and self-reflection in relation to teachers' digital competences. For the pilot training, the original model designed by the Spanish partners was implemented within the same Moodle environment and fully replicated in all project partner countries through the appropriate translation of the content into the national language. One exception was Finland, which required a specific adaptation for its context.

In order to ensure the effectiveness of the model, all partners were provided with guidelines on how to implement the model, communications to be sent to the students with an explanation of the activities to be carried out, and finally an evaluation guide. In designing the training course, two key elements were taken into account: a) evaluation and b) feedback. Moreover:

a) evaluation was designed as individual and group;
b) while, feedback was built on the feedbacks from the virtual classroom and the national team involved in the training and replicated in four countries except for Finland that implemented an original version more relevant to its context.

The participants in the training course also completed an initial and a final questionnaire, through which it was possible to measure and to evaluate the effectiveness of online training through the analysis of the teachers' self-perceived level of competence on the five dimensions of the DTC model.

The online training has been adapted *in itinere* to the different national contexts starting from the duration of the course, and in relation to the information about the participants analyzed in the input phase (e.g. previous online training experiences, training experiences made with the aim of increasing their digital skills, knowledge of innovative methodologies). There were 219 teachers who finished the course.

In Catalonia, the proposed model has not undergone major changes due to the original provenance of the reference framework. 97 participants enrolled in the seminar and 51 completed it with a total duration of 5 weeks, compared to the 4 weeks previously planned. Out of the total number of participants, 94% had previous experience in online training. Moreover, among the main reasons for participating in the proposed seminar, there was a general interest in the TDC model, through the expression of: the desire to develop skills in the dimension of designing training activities (activities, resources and evaluation) through the use of digital technologies (72%); the desire to update one's professional knowledge/skills (53%); the need to develop one's own digital skills (40%); and, finally, the need to participate in training experiences shared with fellow teachers (40%).

In Italy, the training was longer, compared to the initial planning, with a total duration of three and a half months. In Italy, the reasons that induced teachers to enroll in the training course concerned in particular *the need to improve teaching activity* (82.9% of those who finished the training). While only 17% indicated that the motivation was to obtain formal certification.

The course registered the initial interest of 250 teachers, registered on the platform in just one week, 50 of whom ended the course. The high drop-out rate of the initially interested teachers was mainly motivated by the difficulty for teachers to reconcile their training with the many commitments and activities they were involved in at school. The need to reconcile teaching and training time has led to an *in itinere* review of the time devoted to training activities, extending the course to the end of March. In this regard, the first phase of the training was the one that required the most amount of time and a strong investment in individual tutoring actions to recruit teachers, reduce dropouts and form working groups. This is in line with the high drop-out rates that characterize MOOC courses: among those who enroll in a MOOC in fact, only 10-15% complete the training successfully (Parr, 2013; Chen & Zhang, 2017).

In Finland, the program started in November 2018 and ended in February 2019, with 34 teachers enrolled in the course, 15 of whom completed their training. The course was delivered on Omnia's Moodle platform instead of the Link Campus University's Moodle platform. In the case of Finland, the duration of the course was extended from 1 month to 2 months to allow students to complete it. Almost all participants stated that they previously had an experience of online training, although a larger percentage undertook blended, in-presence and online training.

The UK's DECODE online course started on 28 January 2019 with 28 participants initially interested in participating. However, even though the teachers showed a strong interest in the course, only two of them completed it, as the others were already enrolled in several training courses in February and were not able to devote enough time to the proposed training.

Lastly, in Romania, the total number of people initially interested in the course was 300 teachers, 70 of whom completed

the training. For the Romanian teachers, as for the Italian ones, the *need to improve the teaching activity* was dominant (77%); followed by the *need for training on ICT* (63.3%); and, the *updating/improvement of professional skills* (62.7%). About half of the interviewees stated that they enrolled in the course because they were *interested in the subject* (54.3%) and only 30% and 34.5% stated respectively that they wanted to participate in order to obtain a diploma (formal certification) and to share experiences with other colleagues. Finally, 63.3% of teachers declared to have enrolled in the course for other reasons, a potential indicator of the diversification of teachers' expectations and needs in terms of training courses. The 70 teachers who actively participated are also those who, when asked about the motivation behind their registration, showed a more targeted interest, not indicating at all the option "others", which on the contrary was chosen by 63.3% of the initial 300 teachers. This choice expresses highly diversified needs regarding training programs. Moreover, it is worth noting that 80% of the 70 teachers – participants of the course – declared to have previously participated in online learning experiences, compared to 65.3% of the 300 teachers interested in the training path, presumably indicating a positive trend to adopt digital technology in the educational field.

1.2 *SWOT Analysis of the training process*

On the basis of the feedback collected by the training participants during the submission of two questionnaires at the beginning and at the end of the course, it was possible to evaluate the effectiveness of the proposed training and to identify strengths and weaknesses, risks and opportunities regarding the implementation of the seminar itself.

Strengths:

- Student-centered approach;
- Facilitating/Multi-channel tutoring available to learners (e.g. forum, chat, email);
- Involvement of learners through a participatory teaching methodology inspired by the constructivist pedagogical approach;
- Low level of complexity of the designed learning environment;
- Availability of the course in the languages of the project partner countries;
- Cost-effectiveness of the training proposed in Moodle LMS (GNU/GPL License).

Weaknesses/Areas of improvement to be implemented for the re-proposal of the experience:

- Technical difficulties (e.g. management of the first access procedure);
- Lack of an adequate task force dedicated to the administration of the platform that would have allowed an easier and more immediate resolution of the technical criticalities encountered from time to time and a more "user-friendly" design of the interface;
- Training times expected to be too short compared to the needs of the participants to the course.
- Opportunities:
- Replicability and transferability of the training course;
- Development of diversified resources in relation to different needs and learning styles;
- Possibility to customize national training courses;
- Possibility of progressive integration of functionalities and content on Moodle platform.

Risks:

- Risk of a high drop-out rate due to:
  a) lack of an administrator/help desk dedicated to the immediate resolution of technical problems related to the first access (excessive spam was found in relation to the first contact email);
  b) lack of intuitive user interface design, tailored to the training path, also through the addition of further available plugins;
  c) lack of tutors/learning facilitators fully dedicated to the support and animation activities of the platform, which are absolutely necessary for a process entirely designed online and aimed at fostering the socio-relational dimension of learning.

Conclusions

The subsequent comparison of teachers' self-assessments with the differences recorded between the beginning and the end of the course shows interesting results in terms of both the maturation of the level of awareness concerning digital competences and the increase in self-perceived competence acquisition.

In this regard, as it was designed and implemented, the developed training course combines the approach of transformative learning which involves the investment of a high level of thoughtfulness by the adult, with the aim of fostering a real change in professional practices through a revision of their "Paths of Sense". The "Paths of Sense" constitute the selective filters at the basis of our systems of perception, selection, and interpretation of reality. They act as a reference and structuring scheme through which our previous experience assimilates and transforms the new experience.

It is not a coincidence, therefore, that in some cases the ex-post self-assessment allows us to see lower values compared to the statements in the input phase, considering the fact that the transformation process undergoes an overall re-elaboration of the professional self which, according to Jack Mezirow (2016), brings with it:

- a strengthened sense of self;
- a more critical reflection on how social relations and culture have conditioned their beliefs and feelings.

As adult learners, we are prisoners of our own history. As much as we are able to give meaning to our experiences, we all have to start from what we have been given, and work across the horizons set by the way of seeing and understanding that we have acquired through previous learning (Mezirow, 2003: 9).

However, even if the training course has proved to be generally positive for those who started from a certain level of digital competence and from previous training experiences oriented to online collaboration, it should be considered that, for teachers with a less advanced background of digital competence and experience, it could be necessary to define more structured accompanying paths.

At the end of the pilot project, it can probably be confirmed that this training can meet the educational needs of teachers who start from a medium-high level of digital awareness and competence, with a great propensity to invest in non-formal self-training courses. These elements are highlighted as prerequisites for the success of the course. This means that a large part of the professional population has been left out. Therefore, it is necessary to think about the adaptations to the two most significant limitations found:

1. The first is related to the lack of digital awareness and competences necessary to operate in a digital learning environment based on the peer learning model.
2. The second is linked to the difficulties in managing training time, initially intended to be delivered in 30 hours, but in relation to learners' needs extended up to a total time of two and a half months, as suggested by the teachers themselves during the evaluation phase.

In conclusion, shifting the debate to another order of considerations, we can say that the designed and implemented learning environment – albeit with the improvements found – is like an online education initiative in which the online learning path is based on the integration between individual and collaborative learning. Such an approach is characterized by circularity, horizontality, and cooperation between the teaching staff and the learners conceived as learning communities. This model is difficult to apply to large numbers and therefore requires a trained and dedicated tutorship. In this framework, the technological dimension appears to be closely interconnected with the methodological and communicative-motivational one[3], by virtue of the centrality attributed to the interactive dimension, which accompanies the whole learning process (Capogna, 2016).

[3] In this regard, remember the flowering of studies on the centrality of soft skills by the teacher of S. Rahman, RM Yasin, R. Amir, MA Emb, *Psychological Aspects of Online Discussion: Implication for Online Learning Approaches*, in "World Applied Sciences Journal", 2011, 14, Special Issue of Innovation and Pedagogy for Diverse Learners; and on educational leadership as tools to guide the motivation to learn and the collaborative work of S. Reiss, *Multifaceted Nature of Intrinsic Motivation. The Theory of 16 Basic Desires, Review of General Psychology*, 2004, Vol 8, No. 3, pp. 179-193.

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