



ICT COMPETENCIES IN LOGISTICS TRAINING - INTERNATIONAL VIEW

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ABSTRACT. Background: Today's business reality requires employees to continuously develop their professional competence and to keep requalifying in the face of structural unemployment risk. The need for staying up to date on ICT technologies brings into focus the competence that logistics trainers and teachers should demonstrate to be able to teach the human resources in demand by the European economy.

Material and methods: A study into the level of competence required to be able to deliver trainings with the use of ICT tools was conducted among experienced practitioners (trainers and teachers) from Germany, Italy and Poland. The study had a form of a questionnaire survey made available on the project's website. Electronic data has been subject to a statistical analysis with the application of descriptive statistics tools.

Results: The respondents from all the countries agreed that teachers and trainers should demonstrate ICT competencies at the application level. Some differences in this opinion transpired in the course of a detailed analysis of the levels required for each competency.

Conclusions: The results of the survey into which competencies should be given the highest regard differed from country to country. These differences can be attributed to the role of ICT tools in logistics vocational trainings. The respondents from Germany and Poland are focused on the quality of training materials and on their delivery. Italian trainers attach the greatest importance to communication and cooperation with the trainees.

Key words: ICT, e-learning, lifelong learning, competence level.

INTRODUCTION

According to the Lisbon strategy, the European economy is expected to become the most competitive economy in the world. It implies the need for continuous learning, aimed at enhancing the intellectual potential of societies - this is the idea behind the concept of lifelong learning. Since the second half of the '90s lifelong learning has moved to a central position among the EU policies are concerned. It started to be perceived as a vital tool for enhancing competitiveness in Europe's knowledge-based economy. Rising educational aspirations and access to various form of

lifelong learning were intended to promote social cohesion in ever-more diversified societies of the EU member states [Holford 2008].

In the context of the need for lifelong learning and the number of students being on the decline, e-learning seems very promising as a form of education - both in Poland and globally [Wodecki 2010]. Lifelong learning requires new technological solutions. Half of the society can't just go back to school and work through paper textbooks.

With its universality, the Internet seems to show the greatest potential as far as supplying

knowledge is concerned [Cellary 2012]. On top of that, the surveys indicate that school leavers (including university graduates) are ill-equipped to enter the labour market. Hence competencies are a much more valid point of reference for the employers, not a diploma.

It testified to the need for professional lifelong learning [Iwanicka 2012].

The study conducted by the authors indicates that acquiring new skills is viewed by many entrepreneurs as a source of competitive advantage. Customer requirements keep evolving, competition grows ever-stronger nowadays. Unique skills of employees are becoming a more and more valuable asset, enabling companies to provide unique services and innovative products and, in consequence, to expand their customer base. Knowledge helps entrepreneurs to become more efficient. It translates into a growth in demand for their products and services. [Ahrend, Diamond, Webber, 2010].

ICT IN EDUCATION

ICT is an abbreviation of information and communications technology [Webb, Cox 2004]. ICT skills are a staple in professional and everyday life today. Education is no different. Information technologies are growing in importance. Their application in education is referred to as e-learning (a specific type of distance education). Literature on the subject matter abounds with various definitions of e-learning. It is predicated on the fact that e-learning is multi-faceted and can be viewed from many angles. There are two basic perspectives for approaching e-learning: didactic and technological. This paper draws on the definition formulated by M. Hyla. E-learning is thus construed as: "all the activities supporting the training process, based on ICT" [Hyla 2007]. The use of ICT in the didactic process requires specialized tools, which allow for [Berdowska, 2010]:

- Displaying the course content over the Internet,
- Organizing the didactic process, recruiting and reporting,

- Creating accounts for individual users (for progress tracking),
- Tracking progress and time spent on studying,
- Communication between the course participants,
- Keeping the finances in check.

These functionalities are performed with the use of ICT tools and can be of full use provided that their users know how to handle them. Access to these tools and user skills are what determines belonging to the "information society". If the above are in short supply, it is referred to as "information poverty", "information apartheid" and "digital divide" [Selwyn 2003]. The importance of ICT tools in the life of individuals and societies is on the increase probably due to the development of the so-called "social software" and Web 2.0. The idea of creating social software can be traced back to the '60s. This is when computers came into play in the context of user knowledge and experience sharing. Tools enhancing communication through a world-wide net have been developed over the years - such as Usenet, mailing lists or the software for real time discussions. Over the past years we have been observing a rapid development of what is referred to as social software. Market tendencies have been accompanied with technological solutions which enable ever-more sophisticated ways of communicating over the internet.

A shift in the functioning of internet users - namely from information recipients to the creators of user-generated content along with the relevant support technologies have been bundled together into an umbrella term of Web 2.0. This term is suggestive of the blend of the tradition of world-wide web and its new "quality" [Alexander 2006].

The reason behind this phenomenon is the application of management support IT tools and the target group. The term Enterprise 2.0 has been coined in reference to Web 2.0. Enterprise 2.0 describes the entities which use the internet in their daily operations. This activity is diversified: browsing offers, trends, competition analysis, sales, marketing, product

testing, product development [Blue Coat 2008].

The use of ICT tools in education is no longer a matter of making it more appealing, but a real requirement that the educational service providers are faced with. It entails a change in the approach towards the organization of training sessions, creating materials and knowledge assessment. As is the case with each and every change, it is met with reluctance and a disbelief in its efficiency. Which factors contribute to a reluctant approach towards ICT in education [Mumtaz 2000]:

- lack of teaching experience with ICT,
- lack of on-site support for teachers using technology,
- lack of ICT specialist teachers to teach students computer skills,
- lack of computer availability,
- lack of time required to successfully integrate technology into the curriculum,
- lack of financial support.

In the analysis of above mentioned factors the focus was on the first three. In view of the amount of time which has lapsed since the survey referred to in this paper, the remaining factors have been eliminated to a large extent. Common access to technology and falling prices of both devices and internet rates are no longer barriers to development. A problem yet to address is the shortage of fully qualified trainers and teachers who would be able to use ICT tools to boost the efficiency of delivered training sessions.

SURVEY METHODOLOGY

Referring to the conclusions drawn at the end of the previous chapter the employees of the Poznan School of Logistics undertook to conduct a survey into the competence which logistics teachers and trainers should demonstrate to be able to put ICT tools to an effective use in their training sessions. The consultations with trainers and teachers have given rise to an idea of a more complex venture, however. The Poznań School of Logistics was the coordinator of Logistics Open Training for Engineering Competence

(lot4eng.com), project co-funded by the European Commission within the framework of the Transfer of Innovation strand of the Lifelong Learning Programme - Leonardo da Vinci subprogramme. Lot4eng.com intends to provide high-quality e-learning materials best matched to the current market demand and dedicated to improving managerial and engineering competence of beneficiaries (employees of logistic, manufacturing, distribution companies) that are at risk of having competence gap, which would be also a complement to a competence framework for logistics teachers and trainers who bear the responsibility for up-to-date training programmes. In this sense, there will be also designed a completely customized methodological e-learning module improving teachers' and trainers' competence in using innovative ICT technologies, including Web 2.0 technology, in vocational logistic training.

In the first stage of the study a group of experts (employees of training companies and trainers with wide experience under their belt) from Germany, Italy and Poland created a set of 15 competencies required for conducting trainings with the use of ICT tools:

1. Main characteristics of the digital community (web2.0 and new learning paradigms),
2. Factors ensuring effective online teaching in the context of school education and professional training,
3. Basics on Course Management System (CMS), Learning Management System (LMS), Virtual Learning Environment (VLE),
4. Technologies for preparing electronic content: learning scenario, technical scenario, scenario implementation,
5. Web-based environment for e-learning and related teaching models,
6. Didactical digital materials and Learning Objects in SCORM standards,
7. Web2.0 tools to share didactic materials (ex. slideshare, teachertube, etc),
8. Internet, web2.0 technologies and tools (google, youtube, wikipedia, fb, linked-in, vimeo, etc),
9. Tools for digital and social communication: messenger, skype, forums, wiki blogging, podcasting,

- collaborating, social networking, multimedia sharing, social tagging etc.,
10. Search, modify, re-use digital didactic resources available on the net for rapid learning,
 11. Manage and moderate a community/group of e-learners,
 12. Assessment of training needs and effective evaluation of acquired knowledge through e-learning platform tools,
 13. Methods and software for developing multimedia didactic material for online trainings,
 14. Delivery and monitoring of e-trainings,
 15. Effective communication and cooperation in a Web 2.0 environment.

The second stage of works consisted in preparing an electronic survey which asked respondents to define the level of competence that teachers and trainers should demonstrate. The level of competence was measured based on Bloom taxonomy.

Table 1. Bloom Taxonomy
Tabela 1. Taksonomia Blooma

Level	Competences
Evaluation	You can pass judgment on something.
Synthesis	You can create something new as a result of analysis.
Analysis	You can break something down.
Application	You can take something from one context and use it in another.
Comprehension	You understand what you know.
Knowledge	You know something.

Source: [Crowe, Dirks, Wenderoth 2008]

The present analysis is based on datasets which are derived from online questionnaires filled by respondents from each of the three countries. The number of respondents was as follows:

- Germany: n = 21
- Italy: n = 20
- Poland: n = 48

Each respondent was presented with 15 responses, corresponding to the number of competences. The above described datasets have been used for further analyses aimed to respond to the questionnaire objectives

described below. For geographic context of survey's results, additional variables were calculated as the result of aggregation of all competences levels.

Statistical analyses were based on basic principles of descriptive statistics, namely calculation of absolute and relative frequencies for each level of competence on the taxonomy proposed (knowledge, comprehension, application, analysis, synthesis and evaluation, respectively, from the lowest to the highest), as well as sum of frequencies of responses of higher versus lower levels. Mode values are given when significant to the interpretation of results on a particular competence.

GEOGRAPHIC CONTEXT OF SURVEY'S RESULTS

GERMANY

German respondents show a prevalence of responses where application is the most frequent answer: in particular, it is so in 9 out of 15 questions/competences. Overall, the histograms are quite balanced as to the distribution of frequencies for each level of the taxonomy, and of the tendencies towards higher levels (analysis, synthesis and evaluation) versus lower levels (application, comprehension and knowledge).

The competences where a more advanced level of knowledge (shown in table 2) is required - according to the taxonomy on which the questionnaires were based - are, in particular, ICT_10 "Search, modify, re-use digital didactic resources available on the net for rapid learning", and ICT_14 "Delivery and monitoring of e-trainings". On the first question, almost 30% of responses were directed towards the need to possess the skills at the most advanced level, evaluation, while the second most frequent response was synthesis (together with application), and analysis got 16% of the responses. For competence ICT_14, regarding the delivery and monitoring of e-trainings, 24% of the responses again were directed towards the need to possess the skills at the evaluation level, while synthesis and analysis got 34%

altogether (and thus the first three levels of the taxonomy were well above 50% of all responses).

Also, for competence ICT_5 "Web-based environment for e-learning and related teaching models" and ICT_6 "Didactical digital materials and Learning Objects in

SCORM standards", 56% of the responses were within the first three levels of the taxonomy (evaluation, synthesis, analysis), indicating that these are two competences that German respondents request to be taught at a fairly high level.

Table 2. The competences required at the highest level according to German respondents
Tabela 2. Najbardziej wymagające kompetencje ICT zdaniem niemieckich respondentów

DE_2_ICT	Factors ensuring effective online teaching in the context of school education and professional training.
DE_4_ICT	Technologies for preparing electronic contents: learning scenario, technical scenario, scenario implementation
DE_5_ICT	Web-based environment for e-learning and related teaching models
DE_6_ICT	Didactical digital materials and Learning Objects in SCORM standards
DE_10_ICT	Search, modify, re-use digital didactic resources available on the net for rapid learning
DE_14_ICT	Delivery and monitoring of e-trainings

Source: Own study

ITALY

As for Germany, the most frequent response by Italian respondents across all questions (competencies) is application, with the exceptions of ICT_6 "Didactical digital materials and Learning Objects in SCORM standards", ICT_10 "Search, modify, re-use digital didactic resources available on the net

for rapid learning" and ICT_15 "Effective communication and cooperation in a Web 2.0 environment", where they express the need to have a competence at a knowledge, analysis and evaluation level respectively. The competences for which the respondents tend to require a higher level on the taxonomy are discussed below.

Table 3. The competences required at the highest level according to Italian respondents
Tabela 3. Najbardziej wymagające kompetencje ICT zdaniem włoskich respondentów

IT_7_ICT	Web2.0 tools to share didactic materials (ex. slideshare, teachertube, etc)
IT_8_ICT	Internet, web2.0 technologies and tools (google, youtube, wikipedia, fb, linked-in, vimeo, etc)
IT_9_ICT	Tools for digital and social communication: messenger, skype, forums, wiki blogging, podcasting, collaborating, social networking, multimedia sharing, social tagging etc.
IT_15_ICT	Effective communication and cooperation in a Web 2.0 environment.

Source: Own study

In particular, respondents think that competence ICT_7 "Web2.0 tools to share didactic materials (ex. slideshare, teachertube, etc)" is required to be taught at an advanced level (evaluation, synthesis and analysis cumulatively get 52% of the responses); the same first three levels of the taxonomy get 57% of the total responses for the competence ICT_8 "Internet, web2.0 technologies and tools (google, youtube, wikipedia, fb, linked-in, vimeo, etc)", although for both cases the most frequent response is application.

Competence ICT_9 "Tools for digital and social communication: messenger, skype, forums, wiki blogging, podcasting, collaborating, social networking, multimedia sharing, social tagging etc.", too, receives a cumulative frequency of the first three levels of the taxonomy which is above 50% (53%). This competence is somewhat similar to the ICT_8 one, indicating that Italian respondents think that the social networking tools are of

much importance among ICT competences for the logistics employees.

It can also be noticed how for competence ICT_15 "Effective communication and cooperation in a Web 2.0 environment", the evaluation level is the most frequent response, getting 27% of the total responses (the first three levels on the taxonomy are worth 50% of the responses).

POLAND

The most frequent response by Polish respondents across all questions (competencies) is application (the only exception is ICT_12 "Assessment of training needs and effective evaluation of acquired knowledge through e-learning platform tools", where they express the need to have a competence at an evaluation level). Other competencies that require a higher level on the taxonomy are presented in table 4.

Table 4. The competences required at the highest level according to Polish respondents
Tabela 4. Najbardziej wymagające kompetencje ICT zdaniem polskich respondentów

PL_1_ICT	Main characteristics of the digital community (web2.0 and new learning paradigms)
PL_2_ICT	Factors ensuring effective online teaching in the context of school education and professional training.
PL_10_ICT	Search, modify, re-use digital didactic resources available on the net for rapid learning
PL_11_ICT	Manage and moderate a community/group of e-learners
PL_12_ICT	Assessment of training needs and effective evaluation of acquired knowledge through e-learning platform tools.

Source: Own study

In particular, competence ICT_12 "Assessment of training needs and effective evaluation of acquired knowledge through e-learning platform tools" shows a cumulative frequency of 59% of responses in the first three levels of the taxonomy (evaluation, synthesis, analysis). The need to possess this competence at the most advanced level, evaluation, is worth alone 30% of the responses. Besides, competence ICT_10 "Search, modify, re-use digital didactic resources available on the net for rapid learning" is also strongly requested, as the most frequent response is the evaluation level and the cumulative frequency of the

evaluation, synthesis and analysis levels is 58%.

Competence ICT_2 "Factors ensuring effective online teaching in the context of school education and professional training" receives, like ICT_10 "Search, modify, re-use digital didactic resources available on the net for rapid learning" the evaluation level as the most frequent response. Competences ICT_2, ICT_1 "Main characteristics of the digital community (web2.0 and new learning paradigms)" and ICT_11 "Manage and moderate a community/group of e-learners"

exhibit a cumulative frequency of the evaluation, synthesis and analysis levels slightly above 50%.

CONCLUSIONS

Analysing responses of German respondents it is possible to notice that with the exception of competence ICT_1 (showing most frequent responses on the knowledge and analysis levels) and other competencies on high levels (particularly evaluation and analysis), the cumulative frequencies are centred around the average level of application and the surrounding levels of analysis and comprehension. This is confirmed by the fact that in 8 out of 15 cases (competences), the cumulative frequency of the lowest three levels (knowledge, comprehension, and application) are higher than the cumulative frequency of the highest three levels (analysis, synthesis, and evaluation); in 7 out of 15 cases we have the opposite situation, where the cumulative frequency of the highest three levels is higher than the cumulative frequency of the lowest three levels.

However, differently from Germany, Italian respondents tend to indicate that competences are to be taught at the "low" levels of the taxonomy. The histograms show a general preference for the responses knowledge, comprehension, and application for most of the questions/competences. In fact, in 10 out of 15 questions/competences, the cumulative frequencies for the lower levels of the taxonomy (knowledge, comprehension, and application) are higher than the cumulative frequencies for the higher levels (analysis, synthesis, and evaluation). This indicates that the view of Italian respondents on the competences required in the field of logistics are of a more "practical" level, where employees need to apply - and sometimes simply know and comprehend - the basic elements for each competence.

Polish respondents exhibit on average a preference for lower levels of the taxonomy: in 10 out of 15 questions (competences), the average mean of relative frequencies on the lowest three levels (knowledge, comprehension, and application) is higher than

the average mean of relative frequencies on the highest three levels (analysis, synthesis, and evaluation).

The exceptions are competencies ICT_1, ICT_2, ICT_10, ICT_11, and ICT_12.

This indicates that respondents in this country think that the ICT competencies for logistics employees are to be taught at an intermediate level of the taxonomy, a level at which they can apply and understand knowledge and not necessarily be able to analyse, synthesize and evaluate the principles of each of the 15 competences listed, with the above mentioned exception.

To sum up, the survey leads to two basic conclusions. At first glance the perception of ICT competence requirements among logistics teachers and trainers is rather uniform irrespective of the country. The most expected competence level is application. On the one hand, it corroborates the existence of a barrier to the proliferation of ICT tools (as mentioned in the literature part) and, on the other hand, on what the trainers expect from these tools. In their opinion the tools needn't be a basis in all aspects of training sessions, but rather a supporting element, to be used and implemented during sessions. The second conclusion pertained to which competencies are required at the highest level. In this area the respondents from various countries were not unanimous. Only two competencies were the same (ICT_2 and ICT_10 in the case of Poland and Germany). In the case of Germany and Poland emphasis will be on creating and delivering materials to the trainees. In Italy the highest regard was given to the organization of functionalities related to communication and collaboration within Web 2.0.

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KOMPETENCJE ICT W SZKOLENIACH LOGISTYCZNYCH - SPOJRZENIE MIĘDZYNARODOWE

STRESZCZENIE. Wstęp: Wymagania stawiane przez współczesną gospodarkę pracownikom dotyczące ciągłego rozwoju kompetencji zawodowych jak również konieczności przekwalifikowania się w sytuacji zagrożenia bezrobociem strukturalnym wymagają uczenia się przez całe życie. To z kolei w dobie ciągle rosnącego zainteresowania technologiami informacyjnymi (ICT) nakazuje się zastanowić jakimi kompetencjami powinni dysponować trenerzy i szkoleniowcy z obszaru logistyki aby skutecznie dokształcać kadry niezbędne europejskiej gospodarce.

Metody: Badania poziomu kompetencji wymaganego w realizacji szkoleń z wykorzystaniem narzędzi ICT przeprowadzono wśród doświadczonych praktyków (trenerów i szkoleniowców) z Niemiec, Włoch i Polski. Badanie

przeprowadzono za pomocą kwestionariusza ankiety udostępnianego za pośrednictwem strony internetowej projektu. Zebrane dane w formie elektronicznej poddano analizie statystycznej przy wykorzystaniu narzędzi statystyki opisowej.

Wyniki: Respondenci ze wszy kich krajów zgodnie wskazują, że kompetencje ICT trenerów i szkoleniowców powinny być najczęściej na poziomie stosować. Różnice dostrzec może jednak w szczegółowej analizie wymaganego poziomu dla poszczególnych kompetencji.

Wnioski: Różnic w wynikach pochodzących z poszczególnych krajów w określaniu, jakie kompetencje ICT są wymagane na najwyższym poziomie należy upatrywać w roli, jaką mają spełnić narzędzia ICT w szkoleniach zawodowych w obszarze logistyki. Respondenci z Niemiec i Polski skupiają się, na jakości materiałów szkoleniowych oraz sposobie ich dostarczania. Włoscy szkoleniowcy wskazują, że najistotniejsze jest wykorzystanie narzędzi wspomagających wzajemną komunikację i współpracę z uczestnikami szkoleń.

Słowa kluczowe: ICT, e-learning, uczenie przez całe życie, poziom kompetencji

ICT-KOMPETENZEN IN DEN LOGISTIKSCHULUNGEN - INTERNATIONALE PERSPEKTIVE

ZUSAMMENFASSUNG. Einleitung: Die Anforderungen der heutigen Wirtschaft an Arbeitnehmer in Bezug auf die kontinuierliche Entwicklung von Berufsqualifikationen sowie die Notwendigkeit der Umschulung bei Gefahr einer strukturellen Arbeitslosigkeit erfordern lebenslanges Lernen. Das stetig wachsende Interesse an Informations- und Kommunikationstechnologien (ICT) bedarf es wiederum, sich zu überlegen, über welche Kompetenzen die Ausbildungskräfte im Bereich Logistik verfügen sollen, um die notwendigen Arbeitskräfte für die europäische Wirtschaft erfolgreich weiterbilden zu können.

Methoden: Die Untersuchungen des Kompetenzniveaus, das zur Durchführung von Schulungen mit der Anwendung von den IKT-Werkzeugen erforderlich ist, wurden unter den erfahrenen Praktikern (Ausbildungskräften) aus Deutschland, Italien und Polen durchgeführt. Die Untersuchung wurde mit Hilfe eines elektronischen Fragebogens durchgeführt, welcher auf der Webseite des Projektes zur Verfügung gestellt wurde. Die erfassten Daten wurden einer statistischen Analyse unter Anwendung von Werkzeugen der deskriptiven Statistik unterzogen.

Ergebnisse: Die Befragten aus allen Ländern weisen ausdrücklich darauf hin, dass die IKT-Kompetenzen der Ausbildungskräfte in den meisten Fällen auf dem Niveau der Anwendung (application) zurecht kommen sollen. Die Unterschiede sind jedoch in einer detaillierten Analyse des Niveaus für die einzelnen Kompetenzen zu beobachten.

Fazit: Die Unterschiede in den Ergebnissen aus den einzelnen Ländern bei der Festlegung, welche IKT-Kompetenzen auf dem höchsten Niveau erfordert werden, sind in der Rolle zu sehen, welche die IKT-Werkzeuge in den Berufsschulungen im Bereich Logistik zu erfüllen haben. Die Befragten aus Deutschland und Polen konzentrieren sich auf die Qualität der Schulungsmaterialien sowie auf deren Lieferungsart. Die italienischen Ausbildungskräfte weisen darauf hin, dass der Einsatz von Werkzeugen zur Unterstützung der gegenseitigen Kommunikation und Zusammenarbeit mit Schulungsteilnehmern am wichtigsten ist.

Codewörter: IKT, E-Learning, lebenslanges Lernen, Kompetenzniveau

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