

Responding to the Employability Challenge: Final Projects for IT-based Organizational Training

Dorothy Langley and Miky Ronen
Holon Institute of Technology, Holon, Israel

langley@hit.ac.il; ronen@hit.ac.il

Abstract

Catering for student employability is now recognized as an area of accountability for institutions of higher education. Responding to this challenge requires a clearer understanding of the meaning of employability, the attributes that enhance graduate employability and methods which can be adopted by HE institutions to promote it.

In this paper we will examine the issue in the context of the IST department of a technological college preparing students for careers in Organizational Training. The graduates are expected to be able to analyze, design, develop, evaluate, implement and manage instructional systems and other learning environments. The paper will focus on the contribution of the curriculum structure and final projects to graduates' employability. Two research questions will be discussed:

1. To what extent do the final projects present authentic organizational training environments?
2. To what extent are the final projects products of integrated curriculum knowledge and skills?

We will present evidence for the effectiveness of the enacted curriculum based on a detailed analysis of a sample of final projects and their relation to the curriculum, and the results of a recent survey of employment and views of department graduates.

Keywords: higher education, employability, capstone (final) projects, organizational training, workplace learning, instructional systems' technologies, web-based-training, interactivity, evaluation research, curriculum

Employability as an Aspect of Quality of Higher Education

Employability, or more precisely, the benefit and usefulness of the study programme for career and work tasks, is regarded as an aspect of quality of higher education (Storen & Aamodt, 2010). This realization is evidenced by the many official pronouncements and curriculum guidance services offered to higher education institutions. The Bologna Accord aims to create a European

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Higher Education Area that promotes mobility, employability and attractiveness of Europe as an educational region (Official Bologna Process website <http://www.ehea.info/article-details.aspx?ArticleId=3>). The Higher Education Academy in the UK has published extensive literature on supporting employability (e.g., The

Higher Education Academy, 2011; Mantz, 2006).

Curriculum design aimed at enhancing employability requires greater clarity in its definition. Mantz (2006) suggests that "Employability is a (multi-faceted) characteristic of the individual....a set of achievements – skills, understandings and personal attributes – that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy." (p. 8). D'Acre-Pool and Sewell (2007) describe employability as

"having a set of skills, knowledge, understanding and personal attributes that make a person more likely to choose and secure occupations in which they can be satisfied and successful." (p. 280).

What are the Attributes that Promote Employability?

Relevant subject-matter knowledge and skills are the traditional attributes. However, it has been realized that additional "soft skills" are vital to being able to function successfully in an organization in the present era. Russell, Russell, and Tastle (2005), referring to employability of Information Systems' students, stress the "ability to communicate effectively in both oral and written format" (p. 1). They define the soft skills most frequently enumerated by industry as

"the ability to: 1) demonstrate effective interpersonal relations, 2) demonstrate self-management strategies, 3) work within teams, 4) solve problems creatively and 5) make decisions." (p. 1).

Westerström and Westerström (2009) claim that

"To be employable as an engineer in today's global market, you will need the theoretical hard skills, like fundamental knowledge of science, mathematics and engineering design, and problem solving skills; soft skills like communication skills, managerial skills, negotiation and interpersonal skills; global skills like being able to work multidisciplinary, with societal issues and solutions on global problems. As well, knowing what working life demands, a feeling for economy and markets, empathy and emotional intelligence are also needed." (p. 5).

These claims are corroborated by the HEFCE (2003) comprehensive research which reports on the main job skill requirements analyzed by interviews with 192 managers who employed university graduates. The list included ability to seek out new information, problem solving ability, ability to work on one's own without supervision, numeracy, written communication skills, formal presentation skills, team-working skills, computing/IT skills and the ability to identify solutions to customers' business problems (p. 13).

The importance of the issue has led to the creation of several general models. Yorke and Knight (2006) offer the 4-component model: Understanding, Skills, Efficacy beliefs and Metacognition. D'Acre-Pool and Sewell (2007) define the **CareerEDGE model**: Career Development Learning, Experience (Work and Life), Degree Subject Knowledge, Understanding and Skills, Generic Skills (including Enterprise skills), Emotional Intelligence model.

How have HE Institutions Responded to the Challenge?

The wide spectrum of required attributes presents a serious challenge to institutions of higher education (HE) wishing to act on their commitment to the employability of students in different departments. A comprehensive study (HEFCE, 2003), investigating universities' efforts to enhance graduate employability and the extent to which they are successful, provided evidence on

how HE courses seek to improve the employability of their graduates, and evaluated the success of these in the light of graduates' experiences in finding their first employment and experiences in their early years of employment. The two most common approaches to skill development, representing two ends of a spectrum, were found to be either 'embedding' skills within degree course or offering students 'parallel' or 'stand-alone' courses. Bloxham (2004) described an institutional curriculum framework approach for embedding skills and employability, and some of the challenges facing this holistic approach to a potentially fragmented area of policy development.

Work Integrated Learning and team-based capstone projects are considered valuable means of preparing students for the workplace and professional practice (von Konsky et al., 2008). Gol et al. (2001) elaborate on the practice of using industry-inspired final year projects. Many tertiary institutions use project-based courses as a capstone for final year engineering, software engineering, computing and informatics students. Such courses give students an opportunity to draw together the apparently disparate learning they have undertaken during the preceding years. Students often work as members of a team, gaining team skills, as well as interacting with industry rather than academics only (Johns-Boast & Flint, 2009).

Employability in Organizational Training – An Overview

The department of Instructional Systems' Technologies (IST) prepares students for careers in Organizational Training and Workplace Learning, which require analysis, design, development, evaluation, implementation and management of instructional systems and other learning environments. The program prepares students to build and test processes, products, systems and services for use in education and training settings. The curriculum provides students with the necessary tools to promote and implement advanced technologies in systems of information, learning and training in the public and the private sectors.

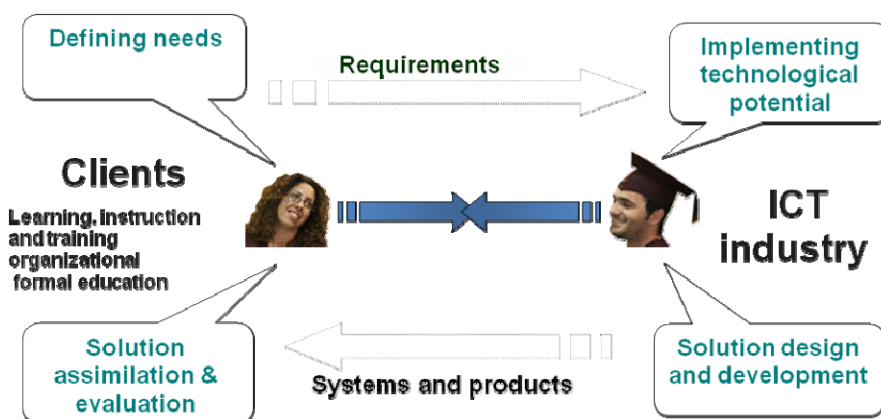


Figure 1. Potential employment scenes for IST graduates

Graduates are expected to be able to function in the following scenes (Figure 1):

Private and public sectors

- development and design of e-learning, games and interactive multimedia
- technology-rich instruction and training in companies and institutions for training employees and clients
- training development and management

Educational frameworks

- development, assimilation and training for on-line and e-learning: adult education and higher education
- informal and formal public education
- educational and community communication media

What are the Needs of the Field?

A survey of the Organizational Learning and Training literature reveals several common issues:

1. Organizations have a large variety of learning and training needs. Organizations require training for new employees, for updating and revising regulations (safety, security, legal aspects), for promotion and for new job definitions. Many organizations allocate dedicated resources to organizational learning and knowledge acquisition. Examples include research staff positions, research and development departments, formal training programs, hiring employees with specialized knowledge, and the development and use of information technology -enabled learning support mechanisms (Kane & Alavi, 2007).
2. Rapid changes in technology/procedures/regulations intensify the training needs. *"There's too much to know and the information changes too fast for people to be constantly called into class"*. (Myers, 2006). The continued need for individual and organizational development can be traced to numerous demands, including maintaining superiority in the marketplace, enhancing employee skills and knowledge, and increasing productivity (Arthur et al. 2003).
3. Newly recruited employees need to assimilate working standards quickly. Orientation training can significantly improve aspects of socialization and affective organizational commitment (Klein & Weaver, 2000). Training is one of the most pervasive methods for enhancing the productivity of individuals and communicating organizational goals to new personnel (Arthur et al. 2003).
4. Different situations require different methods and technologies.

"Concerning the choice of training methods for specified skills and tasks, our results suggest that the effectiveness of organizational training appears to vary as a function of the specified training delivery method, the skill or task being trained, and the criterion used to operationalize effectiveness." (Arthur et al. 2003)

Training methods include "Structured-on-job training" (Jacobs, 2003), Collaboration-oriented blended learning (Kudrik et al., 2009). learning from experienced peers and experts, communities of practice.

5. Time devoted to training needs to be minimized to be cost effective. Organizational management tends to assume that employee will devote their private time to participate in the training. The reality of contemporary organizations is that most employees are being asked to develop higher levels of competence rapidly and continually, without undue interference with the ongoing work of their organization (Jacobs, 2003). The types of learning embraced by the workplace are driven by work conditions and the need to compress the lag time between learning and applying the lessons learned. The use of technology in workplace learning is influenced by the work conditions, time devoted to learning and the pragmatic approach to learning. (Polsani et al. 2009)
6. Information & Communication Technologies (ICT) can offer effective measures to deal with organizational objectives. Information technologies are important tools that augment individual, team, and organizational learning (Roth, 1995).. Kim et al. (2005) claim that E-learning is becoming a dominant delivery method in workplace-learning settings across

organizations of various sectors and of varying sizes. In viewing future trends they predicted that use of interactive simulations would increase the most during the current decade due to advances in Internet technologies, followed by multimedia presentations, authentic learning experiences, and global collaboration and perspective-sharing. Kudrik et al.,(2009) developed the notion of collaboration-oriented blended learning which proposed to address some of shortcomings of self-paced e-learning. Tochermaann and Granitzer (2008) stress workplace integrated e-learning as a better way to cope with the gap between individual demands of a learner and the demands of an organization. Myers (2006) echoes that idea *"IBM is among those companies that hope to give employees access to the instruction they need, on demand, in the workplace"*. Linton and House (2002) propose an approach for instructional technology workplace learning tools that are based on constructivist learning theories and are embedded in the information technology environment of the workplace. Gayesky (2002) suggests the application of wireless technologies and mobile devices for training, communications and performance management.

7. Organizations sometimes apply ineffective training methods. Myers (2006) states that training experts say companies continue to repeat old mistakes:

"They offer off-the-shelf courses or seminars that aren't aligned with employees' everyday responsibilities. They schedule classroom training when the trainer is available rather than when employees need to enhance their skills. They offer lectures, even though adults generally fare better with interactive learning. They pluck trainers from within the ranks, even though these subject experts are unlikely to be skilled facilitators".

The IST Curriculum – Providing Knowledge and Skills

The IST curriculum offers professional academic training, providing students with the necessary tools to promote implementation of advanced technologies in information, learning and training systems in the public and the private sectors. The program prepares students to build and test processes, products, system and services for use in education and training settings. The curriculum aims to empower students' to undertake challenging projects.

The 6-semester, multi-disciplinary, theory-and-practice integrated curriculum consists of three inter-related course "domains" (Table 1). The curriculum is designed to provide a solid theoretical basis in central disciplines of the Social, Information and Design Sciences, along with many practical and application skills. Joint course projects (shown in *italics*) are intended to help students integrate knowledge and skills acquired in different courses for responding to instructional and technological challenges. Close contact with Organizational Training professionals who are faculty members, ensures work-place related ecological validity.

Table 1: The Instructional Systems' Technologies Curriculum Joint course projects in colors+italics			
Domain	Year 1	Year 2	Year 3
Learning, Instruction & ICT	Semester 1 Academic Literacy Psychology 1 Sociology in information era Semester 2 Psychology 2 <i>Social Science Research Knowledge organization and representation</i>	Semester 1 Learning Assessment Interactive learning environments E- learning systems and methods Organizational training 1 Research Seminar 1 Semester 2 Computer-based inquiry learning Computer-based instruction <i>Interactive learning environments - design principles</i> Qualitative research Organizational training 2 Research Seminar 2	Semester 1 Evaluation of information technology rich curricula Semester 2 Organizational training technologies Electives: - Ed games and Simulations - Negotiation strategies - Distance teaching - Business Thinking in Training - Systems' assimilation in organizations - Mobile learning Final Project
Information Technologies & Systems	Semester 1 Introduction to computers and telecommunication New media technologies ICT – legal aspects Organizational behavior Semester 2 Informatics 1 Programming intro Data bases intro <i>Computer accessibility</i>	Semester 1 Programming 1 Internet informatics User interface –cognitive aspects Semester 2 <i>Programming 2</i> Knowledge Management Courseware development	Semester 1 Programming 3 Systems analysis Project management Semester 2 Electives: - Advance programming - 3D systems - Technology for users with special needs
Interactive Multimedia	Semester 1 <i>Visual communication Computer graphics</i> Interactive environments Semester 2 <i>Web site development Interface design Interactive programming</i>	Semester 1 <i>Video-design and production Digital editing</i> Animation – design and development Semester 2 <i>Interactive environments - development & design</i> Software development	Electives: - Visual culture

Final Projects: Process and Products

During the third year, students carry out a final project in which they are encouraged to apply their integrated, accumulated skills for analyzing needs and developing and adapting tailored solutions to real-world problems and needs of technology-rich instruction and training in technology-based organizations. The mandatory final project accounts for 7 out of the total 120 credits needed for the degree completion. Final projects are authentic projects in a variety of active organizations such as hospitals, local government agencies, the police service, military training, telecommunication companies, the aviation industry and financial organizations (sample in Table 2) .

The project is usually carried out by student pairs who are assigned academic and organizational mentors. The academic mentors provide guidance for the technological aspects and the development and research aspects. The organizational mentor acts as a mediator and presents the organizational expectations.

The project preparation process takes place during the fifth and sixth semesters in the final year. The "final project seminar" deals with matching available project themes to students' abilities and

inclinations, formulating and revising project proposals, carrying out surveys of the literature, preparing and trialling the project materials in the organization, reviewing and critiquing peer products, implementing and evaluating the products and finally writing a comprehensive project report.

The projects are carried out during the sixth semester and the data analysis and writing usually continue through the summer vacation. Lecturers, mentors and peers gather at the end of the summer vacation to participate in the final project presentation session. The projects and presentations are evaluated and graded by the department academic staff.

Table 2: List of final projects presented in October 2010	
The Organization	Project topic
Training Organizational Employees – Workplace Learning	
E-Learning company	Information Security courseware
Internet security company	Training recruitment officers
Internet filtering company	Training End-user service providers
Web-based teaching	Training technical support personnel
Credit card company	Banking regulation compliance training
Law courts	Training for the computerized system
Police force	Integrating investigation reports in the organization LMS
Aviation Industry	The human factor in aviation maintenance
Educational organization	Web-based training for educational project implementation
Voluntary medical equipment organization	Training for equipment loaning
Educational environment	
Children's hospital	Portal for educational purposes
At-risk children and families' organization	A computer environment for improving parent –children communication
School for Sailing	Simulation of a sailing maneuver
Instructional Tools	
Military training installation	Learning task generator
Engineering College	Interactive 2-dimensional navigation authoring system

Final Project Analysis

Research Questions

- 1. To what extent do the final projects present authentic, organizational training /workplace learning environments?**
- 2. To what extent are the final projects products of integrated curriculum knowledge and skills?**

We shall provide evidence by analyzing 3 sample projects of the 2010 cohort. The projects represent several IT-based methods for responding to a variety of organizational training and workplace learning needs: End user training in call centres, Generic Information Security training and Training for Recruitment Managers. The organizations have been given fictitious names to protect client identities. For each project we will describe the organizational background, the solution design and some of the implementation process. Based on this description we will validate the authenticity of the projects. We shall further demonstrate how the process and products of students' work can be seen as manifestations of the integrated knowledge and skills related to different components of the curriculum.

Sample Projects

Project 1: Web-based training for Internet Service Providers' (ISP) support representatives

Background: Cleanview Technologies has developed web-site content filtering software, which is used mainly by parents for limiting their children's access to undesirable content on the internet. The software is distributed to the end-users by ISPs. Technical support representatives need to be able to respond effectively to calls from users, without involving Cleanview's support department.

The existing training for new support personnel was based on a two week basic course, followed by OJT (on-job-training) by senior workers. Although OJT has the advantage of authenticity and apprenticeship it tends to lack uniformity and comprehensiveness. More effective training was required. The project was undertaken by a single student, who was an employee of Cleanview's training department.

Solution design: The project solution was an LMS-based, self-paced, interactive course for training new personnel and narrowing knowledge gaps between workers (Figure 2). This solution was expected to provide reasonable ROI, enable knowledge conservation, support revision by Cleanview's product designers, as well as by the ISP training department.

The process was based on the ADDIE methodology (Molenda, 2003). The initial state was **analyzed** using observations at the ISP support center, interviews with support personnel on various levels, as well as with the knowledge management and training management department heads. Various training solutions were **designed** and evaluated. The chosen optimal solution was defined and approved by the client. A storage infrastructure was designed requiring independent learning of an open-code LMS system by the student. Three initial prototype models were **developed**, peer-reviewed and were "quality assurance" tested. **Implementation** included initial training for the ISP company, a limited pilot course, and delivery of the final product to the training departments of Cleanview and the ISP. A small scale **evaluation** was carried out to test content validity, usability, learning quality and user experience.



Figure 2: Sample product for the ISP personnel and the client training

Project 2: Information security courseware for the remote-teach company

Background: The client was the Remote-Teach training development company. The intended product was a generic courseware unit, promoting an organizational culture of protecting the organizational critical information assets. Although this is a vitally important field, employees often consider it a "boring" subject, and lack motivation towards investing time and effort in developing relevant knowledge and skills.

Solution design: The courseware was developed as an interactive tutorial, featuring two leading characters discussing security issues in authentic dilemma situation scenes in technology-based organizations (Figure 3). The students themselves "acted" the two parts using language related to the mainstream culture and appealing to rational as well as affective motivation. Interactivity allows learners to check their understanding and receive feedback. The situations cover two core issues: Information protection in the work environment and Information protection in the computer environment. The courseware is comprised of 6 units, each dealing with a specific information protection issue. Each acted scene ends with a summary of the main points. The summary section presents an interactive booklet, briefly summarizing the correct behaviour patterns workers should adopt in order to be full partners in safeguarding organizational information.



Figure 3: Information Security courseware, menu, and interactive game design

Quantitative and qualitative **evaluation** research was conducted on a small sample of employees in several relevant organizations using a one-on-one approach. The methodology included a short introduction to the courseware, a twenty minute, guided complete activation of the courseware, followed by a questionnaire containing multiple choice and open questions.

The process: Needs **analysis** in collaboration with the Remote-Teach training manager led to the decision to develop a generic courseware. **Design** was discussed with the academic mentor, and

in class discussions leading to content analysis and topic organization. Target audience was characterized through unstructured interviews with employees of several technological organizations. The **development** stage included generating a concept of the general story line and self-study of motivational communication methods. **Implementation** tools were Power point, Photoshop (image design) and Flash (interactive screens). The product required photography of the actors in different outfits to create variety and interest and adding audio-visual effects.

Project 3: Employee recruitment courseware for an international internet-security company.

Background: The original clients were the Training and Human Resource (HR) departments in a leading international internet-security company. Although recruiting high quality employees is a vital issue for the company, it did not have a well-organized learning environment for the process. A previously prepared instruction booklet had not been properly assimilated, and the language was not suitable for overseas company branches.

Solution design: This project eventually produced two English-language courseware units. The product for the original client was "clean looking", Microsoft Power-Point based (Figure 4). The second product (for an unexpected overseas company), was more colourful and animated and based on the Composica authoring system (<http://www.composica.com/>) (Figure 5).

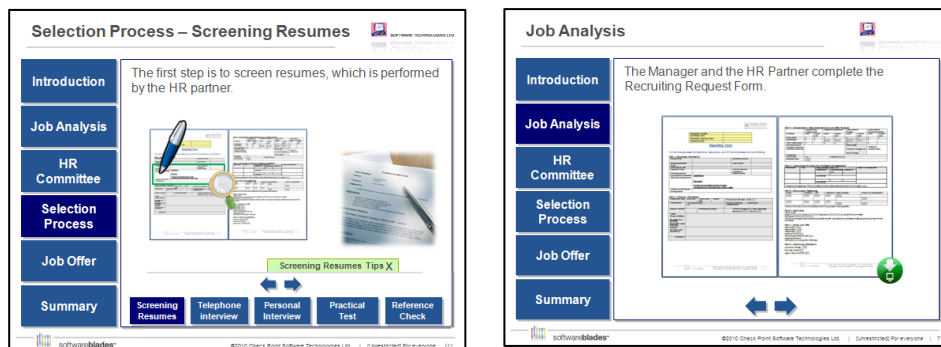


Figure 4: Training for employment managers – Product 1

Process: Following a needs' **analysis** with the original clients' representatives, several solutions were considered and evaluated and a courseware solution was decided upon. **Design** included content analysis and decisions on the development platform. A flow-chart of the recruitment process was prepared, working with the content expert. The **development** included 8 different versions based on several approaches (e.g. game approach). Peer evaluation was carried out in class. All, but the final version, were rejected by the company representatives. The courseware was **implemented** using a power-point platform, and was designed to be relatively short and focused on the manager's responsibilities. The general "look" corresponded with other company presentations. A quiz was included. A graphics repository was created to enhance visualization. A small scale **evaluation** process was developed and performed. It included a comprehension level, multiple-choice content test, and an on-line attitude survey.

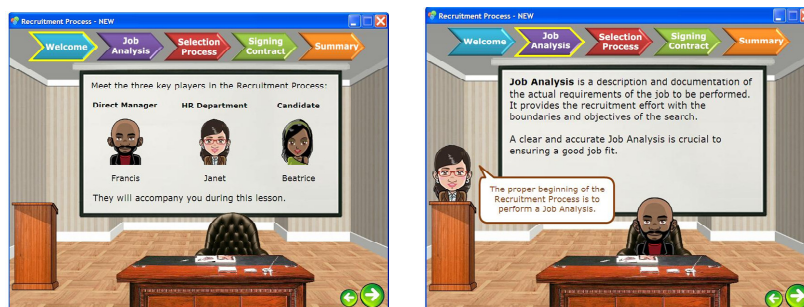


Figure 5: Training for employment managers – Product 2

The second product was a spin off of the development stage, using the Compositica courseware authoring software (<http://www.compositica.com/>) and offered to an interested company in Africa. The screen was designed to resemble a typical office. The instructional content was delivered using dialogue between two main characters: the recruitment manager-learner and the HR department-instructor. The characters were presented to visually match the socio-ethnic environment in which the software would be used. The learning environment contained representative visual icons and user-friendly navigation tools, taking into account the client's expected level of IT literacy. The final version was stored in Box.net and the link sent to the client.

Discussion

1. To what extent do the final projects present authentic, organizational training /workplace learning environments?

The list of 2010 projects (Table 2) shows the scope of organizational training challenges the students were able to respond to successfully, in the relatively limited time available to them. This is further evidenced by the 3 projects which were described in detail. The student teams responded in a professional manner to real organizational needs. They explored the organizational situation and existing needs from the point of view of involved stakeholders. They negotiated with client representatives, clarifying the requirements and suggesting solutions. They were able to act flexibly as requirements changed. They delivered creative, instructionally sound, technological solutions to the client organizations. The decision to produce updateable environments indicates students' concern for solution sustainability. These products will be assimilated into the organizational training procedures for long term usefulness. All these features indicate that student project teams acted as professional organizational training service providers.

2. To what extent are the final projects products of integrated curriculum knowledge and skills?

We have analyzed the main knowledge and skills involved in the final projects and related them to courses in the IST curriculum (Appendix). The detailed documentation of the project preparation process and the final products in the student project reports facilitate the required linking to the curriculum components. The documentation shows appropriate use of terminology, relevant theoretical understanding, information technology skills including programming in a variety of environments, instructional design skills, visual media skills, skills for research and evaluation, a knowledge of workplace e-learning, and a variety of soft skills.

Evidence from the Field - Graduate Survey

Towards the end of November 2010 an independent agency carried out a 15 item, structured phone survey amongst the past 7 years IST graduates. The sample included 105 out of the 139 named graduates. Graduates were interviewed regarding their current employment field and job definitions. They evaluated the contribution of their IST studies to employability, general satisfaction with their study program and recommendation to friends (1-7 Likert scales). The survey included open ended questions regarding interest in a master's degree and suggestions for curriculum changes. Tables 3 and 4 show the breakdown of employment fields and job definitions for the 99 employed respondents. These data show that the IST department graduates do indeed have employable knowledge and skills and are able to secure jobs related to their field of study. Amongst the surveyed graduates 67% asserted that the IST curriculum had contributed greatly to their current employment, and 51% felt that they had an advantage over other candidates for positions in training development and management (including the IT-based type). The overall general satisfaction with the IST studies was quite high (mean of 5.7 (s.d. 1.1) on the 1-7 scale). Of those who asserted that they were satisfied with the IST studies, 37% related their satisfaction to having been provided with practical and innovative employment tools, to the high correspondence with the work field and to the opportunities they had been given for practical experience.

Table 3: Graduate employment by type of organization (N=99)	
Institution	%
Hi-tec, startup companies	32%
Educational system & Academia	21%
Telecommunication companies	7%
Financial organizations	7%
Army and Aviation Industry	4%
Government institutions	3%
Other	25%

Table 4: Distribution of occupations of IST graduates (N=99)

Table 4: Distribution of occupations of IST graduates (N=99)					
Occupation		Job description	%	%	%
Direct link to IST studies	Job definition				
YES	A. Training and assimilation of IST	Training manager /Project manager	8	*69	87
		Training developer	25		
		Trainer/teacher	15		
		Assimilation of web based training	12		
		Information System assimilator	5		
		Knowledge management	4		
	B. Development of interactive training systems	Programmer & technology developer	12	*26	
		Graphic designer	8		
		Courseware/game developer	3		
		Web site developer	3		
NO	Various	Software evaluator, Quality assurance, Sales promotion, HR	8	13	13
		Other	5		

* Same graduate has more than one job definition

Summary and Implications

Catering for student employability is now recognized as an area of accountability for institutions of higher education. Responding to this challenge requires a clearer understanding of the meaning of employability, the attributes that enhance graduate employability and methods which can be adopted by HE institutions to promote it. A survey of the literature indicates that "employability" is a multi-faceted characteristic of the individual including skills, understandings and personal attributes. Institutions of higher educations aiming to respond to the employability challenge must re-examine the offered curriculum to ascertain whether it has the potential to enhance the "hard" and "soft" skills employers now expect.

In this paper we have examined the issue in the context of the department of Instructional Systems' Technologies, preparing students for careers in Organizational Training. The world of Organizational Training is complex by definition. The clients' fields of expertise are highly diverse (e.g. Food industry, telecommunication, banking, insurance, government agencies, community services and educational institutions). The training needs span a wide spectrum including training and on-boarding new employees, workplace learning of new products and procedures, reinforcing regulations and behavior norms, re-designing previous training products, training for new job definitions and providing information and assistance for end users. There are many methods and technologies for dealing with organizational training needs, and the successful

solution should correspond to the organizational information systems, levels of IT expertise, organizational culture, and other constraints.

In view of this complexity, and the strong likelihood of technological, economical and policy changes the IST curriculum must contain courses that provide a sound academic basis in relevant fields such as psychology, sociology, programming, learning environment, knowledge management, visual literacy, and research and evaluation methods. Students need to become acquainted with, and participate in, a wide repertoire of technologically enhanced learning methods and environments. Graphic and multimedia skills must be acquired through active, context-relevant learning. Students should experience active, independent and collaborative learning in technological environments so they can adopt them in an informed manner when required in their professional capacity. Students should experience and engage in different types of assessment, including peer assessment (Cassidy, 2006). Courses should confront students with challenging, realistic, problems and situations that have personal meaning for them and are representative for the kind of tasks they will encounter in the future (De Corte, 2003; Gackowski, 2003). Knowledge of the reality of organizational culture and appropriate survival methods are assets that enable fresh graduates to avoid unnecessary conflict in their first jobs.

The IST curriculum design aims to achieve all the above mentioned criteria and more. The question we have examined in this paper is the extent to which the curriculum (including content, skills and activities) provides sufficient foundations for achieving a reasonable level of employability. Capstone workplace projects are the final testing bed for students, just before they graduate. We have analyzed 3 final projects in detail using the students' submitted project reports and enclosed IT products.

This analysis enables us to conclude that students' final projects are indeed authentic, professional efforts in the real world of organizational training and not "safe school simulations". This conclusion is upheld by the results of a recent survey of 99 IST graduates, which shows that employability had indeed been achieved judging by the general employment rate and the job definition distribution. We have also analyzed the key knowledge and skills in the field of Organizational Training and related them to curriculum courses in which they are acquired. Thus we have been able to show the validity of the curriculum design with respect to its intended outcomes.

All this said, it is also important to realize the inherent problems of the final projects and their limitations as predictors of employability. Following are some common problems:

- Project scopes often exceed the students' abilities and time frames.
- Students misjudge the time required to carry out their project and prepare their project report.
- Student teams fail to implement their mentors' suggestions.
- Organizations change their requirements after the project gets under way.
- Organizations resist pedagogically advanced training programs (interactivity, feedback, sound).
- Organizations have excessive expectations and take advantage of the students as cheap labour.
- Evaluation research suffers from low employee/management response.
- Implementation is often delayed due to organizational non-cooperation.

The obvious limitation of final projects as predictors of employability is the fact that the student teams are heavily mentored within both the academic and organizational contexts. This may mask the limitations and beginner-errors of the professional novices. Occasionally, the polished

appearance of the final product is due more to the involvement of the mentors than to the capabilities of the students. The natural variance of skills and talent within the graduating class means that not all students are able to take full advantage of the opportunities afforded by the curriculum, and gain the desired level of employability. Happily, the survey shows that a considerable proportion of the graduates were aware of the contribution of the IST curriculum to their employment prospects.

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Appendix: Relating Key Knowledge and Skills to Curriculum

Key knowledge & skills	Course/ Activity
Organizational Training knowledge and skills	
Needs assessment ADDIE model Kirkpatrick evaluation model, ROI OJT Knowledge management Change management Project design	Psychology 1-2, Sociology in Information era , Organizational Training 1-2, Organizational behavior, Project management, Organizational training technologies, Business Thinking in Training, Systems' assimilation in organizations
Instructional design & Interactive design	
Learning theories Bloom's Taxonomy Motivational models Interactivity Usability& Interface design Assessment methods and tools Instructional games and simulations	Psychology 1-2, E- learning - systems and methods Interactive multimedia, Knowledge organization and representation, Cognitive aspects of interface design, Computer accessibility, Learning assessment and evaluation, ICT-based Curriculum design, Computer-based inquiry learning, Computer-based instruction, Interactive learning environments - design principles.
Programming and technology development skills	
Html Flash, AS3 SQL VB.NET C#.NET Java System development	Website design Interactive programming, Animation Data bases Introduction to programming Programming 1,2,3 Programming 3 System Analysis
Research and Evaluation skills	
Research design Research tools (Survey, Interview, Observation , Content analysis) Information retrieval Data analysis and representation Evaluation Academic writing style	Academic literacy, Social science research methods, Qualitative research, Informatics, Knowledge organization and representation, Learning assessment and evaluation, Evaluation of information technology rich curricula, Research Seminar 1-2
Visual media skills	
Computer graphics PPT presentation Photography Video Animation	Visual communication, Computer graphics, Video-design and production, Digital editing, Animation – design and development
E-learning systems	
LMS/IMS systems, Courseware authoring systems	E- learning systems and methods, Computer-based instruction, Courseware development, Distance training
Soft skills	
Personal Interpersonal Team work	Organizational behavior , Negotiation strategies, ICT – legal aspects Many team projects

Biographies



Dorothy Langley, PhD is a lecturer at the Department of Instructional Systems' Technologies at the Holon Institute of Technology and a member of the Physics group at the Department of Science Teaching at the Weizmann Institute of Science, Rehovot, Israel. She graduated in Physics from the Tel-Aviv University and received her PhD in Science Education from the Weizmann Institute of Science in 2001. Her research focuses on student learning in information technology based environments with a special interest in inquiry activities, teacher education and science teaching.

Email: langley@hit.ac.il



Prof. Miky Ronen is the chair of the Instructional Systems Technologies Department at the Holon Institute of Technology. Her research focuses on the instructional design of interactive learning environments and on the incorporation of technology in the teaching and learning process. She has designed and taught numerous online graduate, undergraduate and teacher training courses and faculty training programs.

Email: ronen@hit.ac.il