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ExperienceMap: A tool to help training managers develop learning experiences

Terence Andre*, Ryan Meyer, Kerri Chik, Elijah Lofgren

TiER1 Performance Solutions, 100 E. Rivercenter Blvd., Covington, KY 41011, USA

Abstract

Learning professionals in both commercial and military organizations use various education and training planning tools to construct courses and full curriculums for a given training need. Most of these tools use some form of job analysis to break down the entire job into a set of competencies and associated knowledge, skills, and abilities (KSAs). The identified KSAs are then mapped to learning objectives that are often grouped together to form a course or series of experiences. Currently, existing courses are mapped into this framework using a manual and labor intensive process. There is a noticeable gap in the ability for training managers to have a visual way to diagnose gaps in a current curriculum based on required competencies for a given role. In this paper, we discuss a tool to help business and learning professionals design integrated, engaging, targeted, and multi-dimensional learning experiences in a visual and fluid way. Through curriculum design research, interviews with subject matter experts, and best practices in usability, the Experience Map (or xMap) was developed to replace spreadsheets, text documents, and manually created visual diagrams. The focus of xMap is to help learning professionals plan, design, visualize, and diagnose experiences through an iterative, four-step fluid process: (1) Define tags such as roles, regions, competencies, time requirements, mode; (2) Design activities with a fluid drag and drop functionality; (3) Analyze results by sorting and filtering on specific activities; and (4) Enhance experiences by rearranging or adding activities. Our team involved several corporate clients and learning experts to help define the requirements and overall design of the xMap tool. Also presented in this paper is formative evaluation of the tool with both commercial and military training experts. Results from the formative evaluation show that learning professionals rate the xMap high in usability and effectiveness over manual methods currently used.

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Keywords: Learning experiences; Competency-based learning; Curriculum planning; Training development; Job analysis

* Corresponding author. Tel. 1-859-663-2114.
E-mail address: t.andre@tier1performance.com

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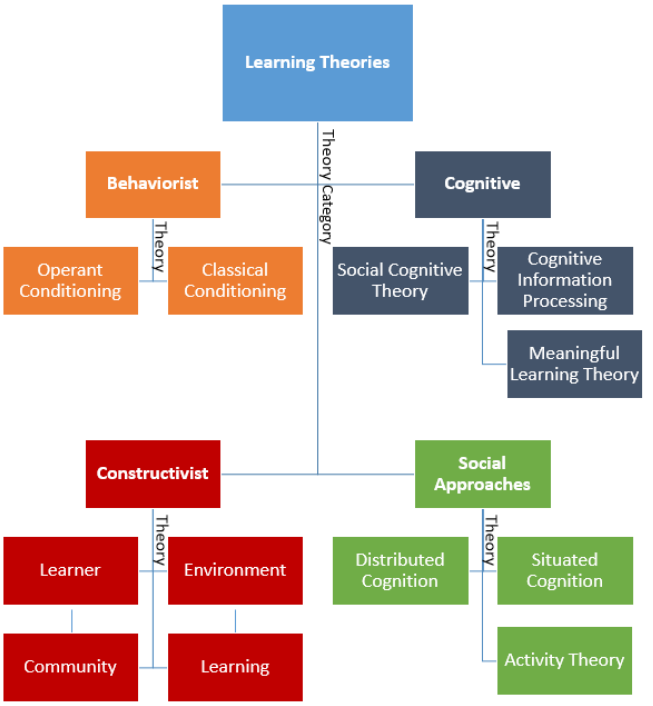

Fig. 1. Concept map of a learning theory course.

1. Introduction

Businesses, educational institutions, government agencies, and other organizations face an array of challenges when seeking to weave multiple learning experiences into a single cogent and cohesive curriculum. At most organizations, this process involves the use of multiple tools, such as spreadsheets, text documents, calendars, and manually built visual diagrams—tools that don't always integrate with one another, which results in a sort of haziness as to the "big picture." As these experiences are expected to meet the needs of increasingly large and diverse audiences, individual learning events can quickly become duplicative or misaligned, competency gaps can become difficult to diagnose, and experiential quality can be compromised. In short, the crucial diagnosis and planning activities related to building learning experiences all too often feel clunky, clumsy, inefficient, and worst of all, ineffective.

1.1. Visualizing learning experiences in industry

Some progress has been made to visualize the big picture of learning experiences in specific niche areas such as career counseling and education. For example, career maps help define a personalized pathway of courses and experiences for an individual. These career maps are typically used by counselors to present a recommended sequence of specific courses and experiences to help high school students increase their competency levels and prepare them to make successful transitions to postsecondary education or work [1]. Career maps are helpful for the career counselor and the individual student, but are not intended to help plan or design the experiences themselves.

Concept maps are often used by educators to support the development of curriculums and specific courses. Educators are frequently involved in developing and revising an academic curriculum. This might involve changes to incorporate new content and skills identified from attending conferences, reading texts and journals, peer-reviewing colleagues' teaching, changes in professional body syllabi, and incorporating new educational outcomes [2]. Such curriculum development and revision can be seen as a chore or an opportunity. An example of a concept

ECONOMICS	Week 1	Aug 24-28	5 days	Unit 1	Scarcity & Choice	1	Decision Making
	Week 2	Aug 31-Sep 4	5 days		Economic Systems	2	
	Week 3	Sep 7-11	4 days		Economic Factors	3	
	Week 4	Sep 14-18	5 days	Unit 2	Demand	4	Budgeting
	Week 5	Sep 21-25	5 days		Supply	5	
	Week 6	Sep 28-Oct 2	5 days		Price	6	Living Alone
	Week 7	Oct 5-9	5 days		Competition	7	
	Week 8	Oct 12-16	4 days	Unit 3	Businesses	8	Consumerism
	Week 9	Oct 19-23	5 days		Financial Institutions	9	
	Week 10	Oct 26-30	5 days		Labor Markets	10	Car Loans
	Week 11	Nov 2-6	5 days		Governments	11	
	Week 12	Nov 9-13	4 days	Unit 4	Measuring Economic Performance	12	Banking
	Week 13	Nov 16-20	5 days		Government & the Economy	13	
	Week 14	Nov 23-27	3 days		Money & Banking	14	Credit
	Week 15	Nov 30-Dec 4	5 days		The Federal Reserve	15	
	Week 16	Dec 7-11	5 days		Economic Growth	16	Saving/Investing
	Week 17	Dec 14-18	5 days		Economic Challenges	17	
		Dec 21-25	0 days		Winter Break		
		Dec 28-Jan 1	0 days				
	Week 18	Jan 4-8	5 days	Unit 5	International Trade	18	
	Week 19	Jan 11-15	5 days		Economic Development	19	Buying a Home
	Week 20	Jan 18-22	4 days		Globalization	20	

Fig. 2. Curriculum map for a high school economics course.

map for a learning theory course is shown in Figure 1. Considerable benefits flow from using the concept map approach, of which the most important is that the process of constructing such maps forces educators to re-consider and question assumptions. Concept maps also help educators better identify curriculum redundancy, omission, complexity, misconceptions and concepts requiring assessment. [2]. But, as can be seen in Figure 1, concept maps are static and do not provide an easy way to visualize the characteristics of each experience for diagnosis or analysis.

A final example in education is the method of curriculum mapping. Curriculum mapping is concerned with what is taught (the content, the areas of expertise addressed, and the learning outcomes), how it is taught (the learning resources, the learning opportunities), when it is taught (the timetable, the curriculum sequence) and the measures used to determine whether the student has achieved the expected learning outcomes [3]. The curriculum map provides a valuable tool for administrators. It helps them to meet their responsibilities in administering the curriculum and provides them with a useful management aid. Using the map, they can identify who is responsible for the different teaching-related activities, and they can assess the accommodation and resource requirements. Figure 2 shows a sample curriculum map a high school economics course.

Some electronic tools have been developed for educators to develop a comprehensive curriculum map that can answer fundamental questions about what students are expected to learn, how they are taught and how they demonstrate learning and academic development. For example, the Association of American Medical College (AAMC) developed CurrMIT to help schools capture the full spectrum of a medical school curriculum with the following benefits [4]:

- identifies curriculum components (e.g., assessment methods, teaching strategies, educational sites)
- determines where new curriculum content is needed
- shares curriculum innovations from other medical schools
- identifies faculty who are doing work in which you are interested

CurrMIT can be a powerful way to capture the complexities of a medical school curriculum, but the utility of the database is limited by the amount of information medical schools enter, which amplifies the need for both inter- and intra-institutional compliance [5]. In addition, CurrMIT is limited to medical curriculum applications and is not

TYPE OF TRAINING	HOURS			
	Fundamentals (ADL)	Fundamentals (Days 1-3)	Operator (Days 3-19)	Combined Hours
Academic	19:20	11:15	27:10	57:45
Part-Task	0:00	4:35	52:20	56:55
Full-Mission	0:00	0:40	22:00	22:40
TOTAL HOURS				137:20

DAY	1		2		3		4		5	
	Lesson	HR	Lesson	HR	Lesson	HR	Lesson	HR	Lesson	HR
Academics	FUN-001	4:30	FUN-113	0:30	FUN-116S	2:30			ISR-467	1:00
	FUN-104	1:00	FUN-114	0:30	ISR-520	1:00			ISR-400	1:00
	FUN-108	0:30			PLN-203	1:00				
	FUN-110	0:30								
	FUN-112	0:30								
SUB-TOTAL		7:00		1:00		4:30				2:00
Part-Task			FUN-302	1:45	ISR-518	1:30	FUN-322	2:00	ISR-415	1:30
			FUN-329	0:45			FUN-313	2:00	ISR-455	2:00
			FUN-304	0:45			ISR-521	4:00	ISR-516	1:00
			FUN-305	0:45						
			FUN-303	0:45						
SUB-TOTAL				4:45		1:30		8:00		4:30
Full-Mission					EOC-600	0:40				
SUB-TOTAL						0:40				
TOTAL		7:00		5:45		6:40		8:00		6:30

Fig. 3. Notional example of an air force training syllabus program flow.

flexible enough to apply across a wide range of learning professional needs. As with concept maps, curriculum maps also have similar drawbacks—they are difficult to develop and do not provide a fluid interface for manipulation and diagnosis.

1.2. Understanding curriculum flows in the military

Training managers in the Air Force and the other military services also have methods to view and understand a curriculum. The most common method takes the form of a comprehensive syllabus plan that contains all the necessary information for a course or curriculum: lesson title, lesson description, prerequisites, number of total hours, and type of training media. Even though the information is contained in one document, it is not an efficient or fluid way to view and diagnose a full curriculum, Figure 3 shows a notional program flow summary of a syllabus for training intelligence operators in the Air Force. At the top of Figure 3 is a breakdown of the academic, part-task training, and full-mission training hours by program schedule. This includes dedicated hours for web-based fundamentals (ADL—Advanced Distributed Learning), in-residence hours for fundamentals on days 1-3, and in-residence hours for operators training on days 3-19. The bottom of Figure 3 shows specific lessons, number of hours for each lesson, and the assignment of lessons to both days and type of training format (academics, part-task training, full-mission training). Only days 1-5 are shown in this example. The combined picture of the intelligence operator training does show the learning professional the total number of hours in this syllabus and how those hours are divided among two dimensions: days and type of training format. In the complete syllabus document, each lesson title is listed along with a description of the lesson. What is missing for the learning professional and other training decision-makers is a way to dynamically manipulate this information. Although much of the information in this example syllabus could be represented in a spreadsheet, that type of view is still very limiting.

1.3. The need for a more fluid tool

Learning professionals have many tools to develop and administer learning experiences—but none created specifically to design the optimal learner experience that aligns diverse learning activities to multiple-dimensions (roles, regions, competencies, proficiencies, processes, skill gaps, etc.). Many of the methods for creating a

comprehensive training program start with some form of job analysis to break down the entire job into a set of competencies and associated knowledge, skills, and abilities (KSAs). KSAs are then mapped to learning objectives that are often grouped together to form a course or series of courses. Existing courses are mapped into this process using a manual process [6]. Despite all the work that goes into creating competencies, KSAs, and learning objectives, the shortfall for learning professionals is that there is no environment to support the ability to plan, design, visualize, and diagnose these learning experiences.

2. Development of the Experience Map

Recognizing this shortfall, our team of researchers and practitioners solicited input from learning professionals to shape the development of a tool that would transform the way learning experiences are planned and analyzed. This input was gathered through focus groups and interviews with Fortune 500 clients, learning subject matter experts, and our own experts at curriculum design and planning. Table 1 summarizes the feedback of these experts as grouped by four needs and the specifics of each of those needs.

Table 1. Specific Needs of Learning Professionals

Need	Specific Description
1. Efficiency of curriculum planning	Curriculum planning tools should make work easier. Majority of time and energy should be spent on designing rich curriculum experiences instead of improvising workarounds for current tools. Free designers from the current hodgepodge of spreadsheets, whiteboards, diagrams, slide decks, and Word documents.
2. Manipulation of experience characteristics	Tool should provide ability to design, align, organize, and analyze activities. Provide ability to easily arrange, sort, and edit activities based on their characteristics and context.
3. Visualization and communication of the curriculum	Enhance designers' vision to not only see the whole experience, but to also see it through different lenses and multiple views. Be able to use as communication tool for others to review.
4. Simplicity of process	Empower designers to sculpt optimal learning and development experiences through an iterative process (define tags, design activities, analyze results, and enhance experience)

Based on these needs, we set out to develop a tool that could help learning professionals in curriculum planning and design. Curriculum planning, or even training design, was too narrow of a focus for the purpose of the tool. Because nearly every learning opportunity is about gaining some type of experience, we focused on the notion of mapping experiences and named the tool the Experience Map (or xMap). The focus of xMap is to help learning professionals plan, design, visualize, and diagnose experiences through an iterative, four-step fluid process:

1. **DEFINE Tags**. The first step in curriculum planning is to clearly articulate and identify the learning targets. The goal of xMap is to capture activity objectives and identify multi-dimensional "tags" such as roles, regions, competencies, time requirements, mode, etc.
2. **DESIGN Activities**. Map existing activities and start creating new ones with a fluid drag and drop functionality.

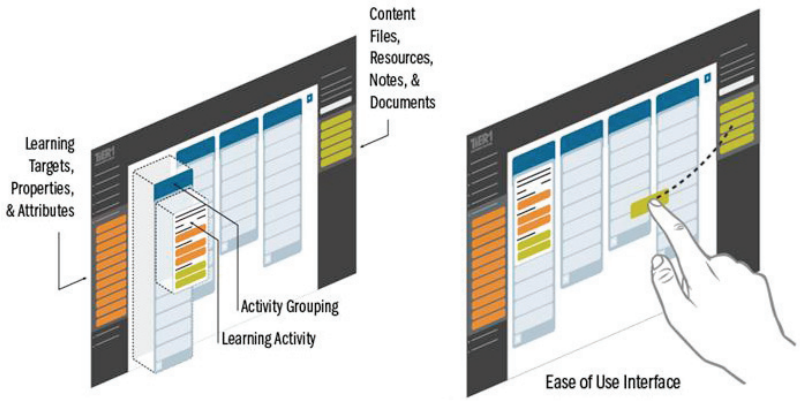

Fig. 4. Visual prototype of the xMap User Interface.

3. **ANALYZE Results**. Sort and examine activities by competency, mode, role, or any other identified characteristics or context. Identify any gaps that may exist.
4. **ENHANCE Experiences**. Once gaps have been identified, add, subtract, enhance, or rearrange an activity with a simple user interface.

2.1. Constructing the interface

Figure 4 shows a visual concept of the fluid process of xMap. A visible "canvas" interface was used to create rich learning and development experiences which are comprised of multiple activities. A click-to-reveal and drag-and-drop interface style was also used so that the user of xMap could carry out complex tasks such as adding learning targets, properties, and attributes. This simple task support allows the user to uniquely identify and analyze each activity. As shown in Figure 5, the user is also able to visualize specific characteristics of a curriculum by highlighting an attribute (e.g., Block of Instruction in this example) and seeing where that attribute appears in their map.

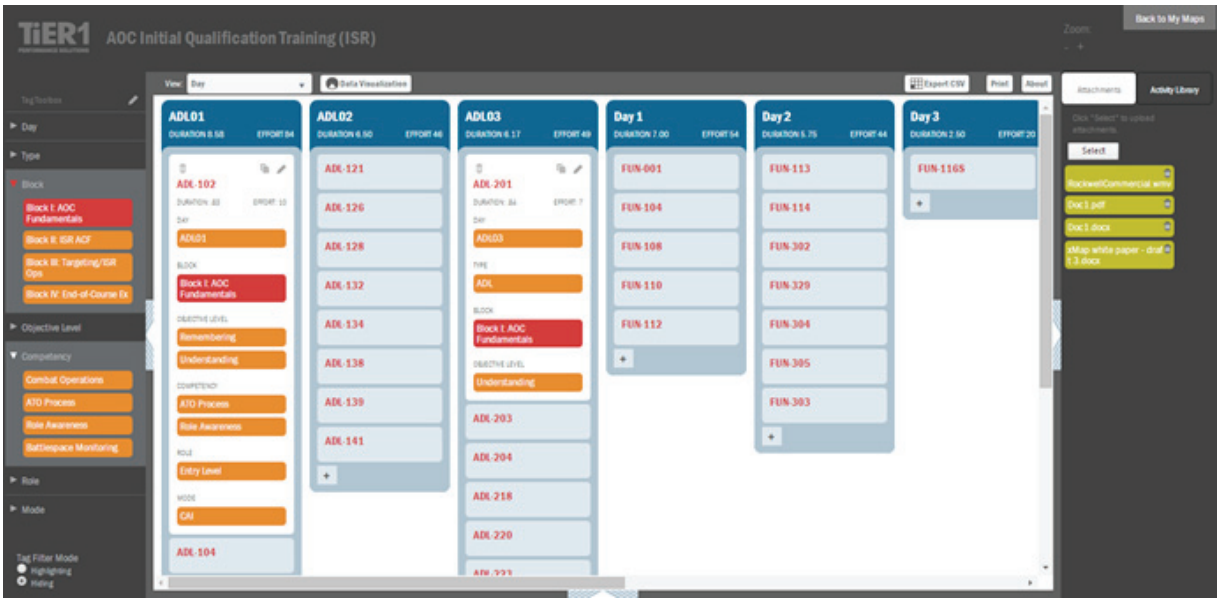

Fig. 5. Example screen interface of xMap Design of an Air Force training course.

3. Addressing the usability and usefulness of xMap

In order to assess the usability and usefulness of xMap, our team started collecting preliminary data through two methods: a usability survey from potential end users and a questionnaire completed by internal curriculum development experts. Research goals for the survey consisted of finding out how frequently the end user would like to use xMap, experiences when using the system, how easy the system was to use, potential technology support needed, and confidence with the system. The System Usability Scale (SUS) was used to collect end user ratings of usability. SUS [7] is a simple, ten-item survey giving a global view of subjective assessments of usability. SUS has proved to be a valuable evaluation tool and correlates well with other subjective measures of usability [7]. The SUS survey was completed after participants sat through an extensive demo at the American Society for Training and Development Conference and interacted with xMap. These survey participants were individuals who held some responsibility for curriculum design and training within their organizations. SUS uses a 5-point Likert scale (1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4- Agree, 5- Strongly Agree) as well as the ability for the participant to add additional comments at the end of the survey. The findings from the SUS survey can be seen in Table 2. The participants found the xMap tool to be easy to learn and not unnecessarily complex. One user stated that, "the system is really awesome. Very intuitive and super flexible. I got started right away with almost no coaching".

Table 2. Initial Survey Findings (N = 9)

Item	M	SD
1. I think that I would like to use this system frequently	4.11	1.05
2. I did not find the system unnecessarily complex	4.33	0.71
3. I thought the system was easy to use	4.11	0.93
4. I do not think that I would need the support of a technical person to be able to use this system	4.11	1.05
5. I found the various functions in this system were well integrated	4.22	0.97
6. I did not think that there was too much inconsistency in this system	4.67	0.50
7. I would imagine that most people would learn to use this system very quickly	4.44	1.01
8. I did not find the system very cumbersome to use	4.67	0.50
9. I felt very confident using the system	4.00	0.70
10. I did not need to learn a lot of things before I could get going with this system	4.56	0.73

Research goals for the internal consultant perspective consisted of discovering the background problem for xMap use and previous approaches used to solve the problem prior to xMap use. The consultants also gave feedback on how the client was helped with xMap use, the client's overall thoughts on xMap use, and any additional observations. These questions were distributed to internal consultants and were completed through a word document. The questionnaire consisted of five open-ended questions that allowed consultant's to describe their experience. Initial feedback found that the use of the xMap tool ranged from reinventing overall curriculum for an organization, revising initial onboarding training, to identifying gaps within current offerings and services. When approaching similar problems in the past, consultants stated that they generally used a variety of tools from spreadsheets, multiple word documents, to PowerPoint presentations. The xMap tool was found to allow consultants and end users to easily move activities between days and/or training modules as well as allowed for consultants to see how each skill area was weighted throughout the course. The positive responses in these early findings demonstrates the usefulness and usability from both the end user and consultant's view.

4. Conclusion

Learning professionals have used various methods and tools to develop and analyze learning experiences, but these methods and tools typically do not provide the kind of visibility, nor the ease of use, to design with multi-dimensional attributes. The result is often a static view of the learning experience without a way to easily make

changes and visualize the results of those changes. From our own research with Fortune 500 clients, learning professionals from these organizations report that their methods and tools for building learning experiences are clunky, inefficient, and ineffective. Based on this research, xMap was developed to help the learning professional design rich learning experiences that provide the needed visibility and diagnosis capability. Although xMap is still in prototype development, initial findings support our research goals of developing a tool that is easy to use and provides useful information.

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