

# **Skills Based Curriculum Development**

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## **Common Curriculum Errors**

- ✍ Failure to teach WHAT should be taught  
(e.g., the latest skills & concepts)**
- ✍ Teaching WHAT should not be taught  
(e.g., outdated skills & equipment)**

CURRICULUM

- Accounting
- Advertising
- Auto Mechanic
- Computer Technician

?

- Data Processing
- Customer Service
- Training Manager
- GIS Technician

## Should We Teach --

➤ What we know best?

➤ What we were taught?

➤ What we enjoy teaching?

➤ What we have experience with?

➤ What the textbook happens to include?

OR

➤ What the student/worker most needs for successful employment?

## What is DACUM?

An Acronym for Developing A Curriculum

<u>A Process for:</u>	<u>Used by:</u>
✓ Job Analysis - single job	✓ Secondary & Post-Secondary Educators
✓ Occupational Analysis - multiple related jobs	✓ Business-Industry Trainers
✓ Process Analysis - multiple categories of jobs	✓ Government-Military Trainers
✓ Conceptual Analysis	

✓ Effective

✓ Quick

✓ Low Cost



## Who Uses DACUM?

- American Electric Power
- AT & T Wireless
- Boeing
- Cingular Wireless
- Coors Brewing
- Eastman Kodak
- Ericsson
- Honda
- John Deere
- General Mills
- University of Pennsylvania
- Oklahoma State University
- University of Central Florida
- Lucent Technologies
- Motorola
- Sterling Commerce
- UAW Ford
- United Airlines
- Walt Disney World
- Westinghouse
- Johnson and Wales
- Ohio State University
- North Dakota State
- Bowling Green State
- Temple University

## DACUM Philosophy

- 🛡️ Expert workers can describe and define their job more accurately than anyone else.
- 🛡️ An effective way to define a job is to precisely describe the tasks that expert workers perform.
- 🛡️ All tasks, in order to be performed correctly, demand certain knowledge, skills, tools, and worker behaviors (*enablers*)

## The DACUM Process



3

## DACUM Workshop

- ~12 expert workers
- Meals & Refreshments
- Hotel Conference room
- Facilitator
- 2 days
- Note Taker



## DACUM Procedure

1. Orient the committee
2. Review the job/occupation
  - A) Develop Organizational Chart
  - B) Conduct initial brainstorming
3. Identify duties (general areas of responsibility)
4. Identify specific tasks performed
5. List:
  - A) General knowledge & skill requirements of the job
  - B) Worker behaviors (desirable attitudes and traits)
  - C) Tools, equipment, supplies, and materials
  - D) Future trends/concerns
6. Review/refine task and duty statements
7. Sequence the task and duty statements
8. Rank the duty & task statements (Tech I, Tech II, Tech III)



## Graphic Representation of Job, Duty, and Task Relationships

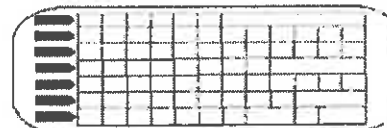
Whole Job



Job Divided into  
Duties (6-12)



Job Divided into  
Duties & Tasks  
(75-125)



## Job, Duty, Task, and Step Examples

<b>JOB</b>	- Homeowner
<b>DUTY</b>	- Maintain the yard
<b>TASK</b>	- Mow the lawn
<b>STEP</b>	- Start the mower

<b>JOB</b>	- Homemaker
<b>DUTY</b>	- Prepare meals
<b>TASK</b>	- Bake cookies
<b>STEP</b>	- Mix ingredients

## Key Terms

- **Duties**    **A cluster of related tasks**  
Usually 6-12 per job
- **Tasks**    **Specific meaningful units of work**  
Usually 6-20 per duty and 75-125 per job
- **Steps**    **Specific elements or activities required to perform a task**  
Always two or more per task

## Duty Statement Criteria

### Duty Statements :

- |  |  |
|--|--|
| ⌘ Describe <u>large areas of work</u> in performance terms                       | ⌘ Serve as title for a cluster of related tasks (usually 6-20/duty)                              |
| ⌘ Consist of one <u>verb</u> , an <u>object</u> , and usually a <u>qualifier</u> | ⌘ Are <u>general</u> , not specific, statements of the work that is performed (usually 6-12/job) |
| ⌘ Stand alone (are meaningful without reference to the job)                      | ⌘ Avoid references to workers behaviors, tools, and knowledge needed                             |

## Sample Duty Statements

- ◆ Create / Acquire Data
- ◆ Maintain / Manage Data
- ◆ Analyze Data
- ◆ Technical Support
- ◆ Generate Products
- ◆ Manage Projects

## Job Task Criteria

### Job Tasks:

- |   |   |
|---|---|
| ⌘ Represent the smallest unit of job activity with a meaningful outcome | ⌘ Result in a <u>product, service, or decision</u>  |
| ⌘ Represent an assignable unit of work                                  | ⌘ Have a definite <u>beginning and ending point</u> |
| ⌘ Can be performed over a short period of time                          | ⌘ Can be <u>observed and measured</u>               |
| ⌘ Can be performed independent of other tasks                           | ⌘ Consist of <u>two or more steps</u>               |

eg

## Sample Task Statements

- ◆ Create maps
- ◆ Geocode address data
- ◆ Refresh / replace layers
- ◆ Edit GIS data
- ◆ Develop databases
- ◆ Write / review technical reports



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	52
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doi:10.1371/journal.pone.0141121.g002

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**2015 Top 100**  
 1. **University of California**  
 2. **Stanford University**  
 3. **MIT**  
 4. **Harvard University**  
 5. **Georgia Institute of Technology**  
 6. **University of Texas at Austin**  
 7. **University of Michigan**  
 8. **University of Wisconsin-Madison**  
 9. **University of Illinois Urbana-Champaign**  
 10. **University of California Berkeley**

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1994-1995, 1996-1997, 1998-1999, 2000-2001, 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013, 2014-2015, 2016-2017, 2018-2019, 2020-2021, 2022-2023, 2024-2025, 2026-2027, 2028-2029, 2030-2031, 2032-2033, 2034-2035, 2036-2037, 2038-2039, 2040-2041, 2042-2043, 2044-2045, 2046-2047, 2048-2049, 2050-2051, 2052-2053, 2054-2055, 2056-2057, 2058-2059, 2060-2061, 2062-2063, 2064-2065, 2066-2067, 2068-2069, 2070-2071, 2072-2073, 2074-2075, 2076-2077, 2078-2079, 2080-2081, 2082-2083, 2084-2085, 2086-2087, 2088-2089, 2090-2091, 2092-2093, 2094-2095, 2096-2097, 2098-2099, 2100-2101, 2102-2103, 2104-2105, 2106-2107, 2108-2109, 2110-2111, 2112-2113, 2114-2115, 2116-2117, 2118-2119, 2120-2121, 2122-2123, 2124-2125, 2126-2127, 2128-2129, 2130-2131, 2132-2133, 2134-2135, 2136-2137, 2138-2139, 2140-2141, 2142-2143, 2144-2145, 2146-2147, 2148-2149, 2150-2151, 2152-2153, 2154-2155, 2156-2157, 2158-2159, 2160-2161, 2162-2163, 2164-2165, 2166-2167, 2168-2169, 2170-2171, 2172-2173, 2174-2175, 2176-2177, 2178-2179, 2180-2181, 2182-2183, 2184-2185, 2186-2187, 2188-2189, 2190-2191, 2192-2193, 2194-2195, 2196-2197, 2198-2199, 2200-2201, 2202-2203, 2204-2205, 2206-2207, 2208-2209, 2210-2211, 2212-2213, 2214-2215, 2216-2217, 2218-2219, 2220-2221, 2222-2223, 2224-2225, 2226-2227, 2228-2229, 2230-2231, 2232-2233, 2234-2235, 2236-2237, 2238-2239, 2240-2241, 2242-2243, 2244-2245, 2246-2247, 2248-2249, 2250-2251, 2252-2253, 2254-2255, 2256-2257, 2258-2259, 2260-2261, 2262-2263, 2264-2265, 2266-2267, 2268-2269, 2270-2271, 2272-2273, 2274-2275, 2276-2277, 2278-2279, 2280-2281, 2282-2283, 2284-2285, 2286-2287, 2288-2289, 2290-2291, 2292-2293, 2294-2295, 2296-2297, 2298-2299, 2300-2301, 2302-2303, 2304-2305, 2306-2307, 2308-2309, 2310-2311, 2312-2313, 2314-2315, 2316-2317, 2318-2319, 2320-2321, 2322-2323, 2324-2325, 2326-2327, 2328-2329, 2330-2331, 2332-2333, 2334-2335, 2336-2337, 2338-2339, 2340-2341, 2342-2343, 2344-2345, 2346-2347, 2348-2349, 2350-2351, 2352-2353, 2354-2355, 2356-2357, 2358-2359, 2360-2361, 2362-2363, 2364-2365, 2366-2367, 2368-2369, 2370-2371, 2372-2373, 2374-2375, 2376-2377, 2378-2379, 2380-2381, 2382-2383, 2384-2385, 2386-2387, 2388-2389, 2390-2391, 2392-2393, 2394-2395, 2396-2397, 2398-2399, 2400-2401, 2402-2403, 2404-2405, 2406-2407, 2408-2409, 2410-2411, 2412-2413, 2414-2415, 2416-2417, 2418-2419, 2420-2421, 2422-2423, 2424-2425, 2426-2427, 2428-2429, 2430-2431, 2432-2433, 2434-2435, 2436-2437, 2438-2439, 2440-2441, 2442-2443, 2444-2445, 2446-2447, 2448-2449, 2450-2451, 2452-2453, 2454-2455, 2456-2457, 2458-2459, 2460-2461, 2462-2463, 2464-2465, 2466-2467, 2468-2469, 2470-2471, 2472-2473, 2474-2475, 2476-2477, 2478-2479, 2480-2481, 2482-2483, 2484-2485, 2486-2487, 2488-2489, 2490-2491, 2492-2493, 2494-2495, 2496-2497, 2498-2499, 2500-2501, 2502-2503, 2504-2505, 2506-2507, 2508-2509, 2510-2511, 2512-2513, 2514-2515, 2516-2517, 2518-2519, 2520-2521, 2522-2523, 2524-2525, 2526-2527, 2528-2529, 2530-2531, 2532-2533, 2534-2535, 2536-2537, 2538-2539, 2540-2541, 2542-2543, 2544-2545, 2546-2547, 2548-2549, 2550-2551, 2552-2553, 2554-2555, 2556-2557, 2558-2559, 2560-2561, 2562-2563, 2564-2565, 2566-2567, 2568-2569, 2570-2571, 2572-2573, 2574-2575, 2576-2577, 2578-2579, 2580-2581, 2582-2583, 2584-2585, 2586-2587, 2588-2589, 2590-2591, 2592-2593, 2594-2595, 2596-2597, 2598-2599, 2600-2601, 2602-2603, 2604-2605, 2606-2607, 2608-2609, 2610-2611, 2612-2613, 2614-2615, 2616-2617, 2618-2619, 2620-2621, 2622-2623, 2624-2625, 2626-2627, 2628-2629, 2630-2631, 2632-2633, 2634-2635, 2636-2637, 2638-2639, 2640-2641, 2642-2643, 2644-2645, 2646-2647, 2648-2649, 2650-2651, 2652-2653, 2654-2655, 2656-2657, 2658-2659, 2660-2661, 2662-2663, 2664-2665, 2666-2667, 2668-2669, 2670-2671, 2672-2673, 2674-2675, 2676-2677, 2678-2679, 2680-2681, 2682-2683, 2684-2685, 2686-2687, 2688-2689, 2690-2691, 2692-2693, 2694-2695, 2696-2697, 2698-2699, 2700-2701, 2702-2703, 2704-2705, 2706-2707, 2708-2709, 2710-2711, 2712-2713, 2714-2715, 2716-2717, 2718-2719, 2720-2721, 2722-2723, 2724-2725, 2726-2727, 2728-2729, 2730-2731, 2732-2733, 2734-2735, 2736-2737,

1.  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$   
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3.  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$   
4.  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$   
5.  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$



**Keywords:** child sexual abuse; disclosure; social support; self-esteem

[illegible]

2000-2001  
 2002-2003  
 2004-2005



Figure 1. Schematic diagram of the experimental setup.

## DACUM Advantages

- Employee involvement and buy-in
- Use of Expert Workers / Panel members
- Efficient: 2 days vs. 6 weeks
- Specific vs. general job specifications
- Identification of critical tasks
- Opportunity for brainstorming & sharing ideas
- Group Consensus / Synergy
- Solid foundation for the Curriculum Development Process



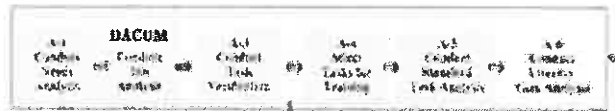
## SCID

## SYSTEMATIC CURRICULUM & INSTRUCTIONAL DEVELOPMENT

### Major Components

### Phases

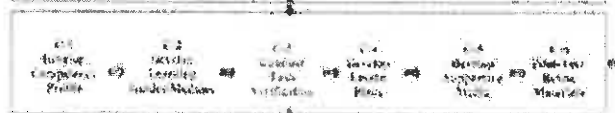
#### A - ANALYSIS



#### B - DESIGN



#### C - DEVELOPMENT



#### D - IMPLEMENTATION



#### E - EVALUATION



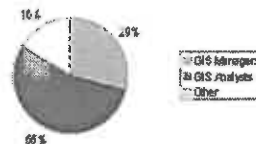
Illustration of SCID phases and components.

## A-3: Task Verification

TASK Rating	1. Do you perform this task?		2. How important is this task to the performance of your job? (Circle 1-5, 1=not important)		3. What is the frequency of this task in your job? (Circle 1-5, 1=not frequent)		4. Is this task required of you?	
	Yes	No	No importance	Great importance	Task occurs in person	Task occurs on computer	Yes	No
<b>DUTY TASK STATEMENTS</b>								
<b>Duty 5: Generate GIS Products (hard copy, electronic)</b>								
5.1 Create maps	Y	N	1	2	3	4	5	Y
5.2 Create maps on computer	Y	N	1	2	3	4	5	Y
5.3 Create charts	Y	N	1	2	3	4	5	Y
5.4 Create tables	Y	N	1	2	3	4	5	Y
5.5 Generate mailing labels	Y	N	1	2	3	4	5	Y

Mailed to 150 GIS  
Professionals in  
San Diego County  
- 75 respondents

Validation Survey Respondents



## A-4: Select Tasks for Training

Results of Task Verification Survey  
GIS Technician  
San Diego Mesa College, Sept. 2000

	Perform	Importance	Frequency	Required	Required
<b>Duty 5: Generate GIS Products (hard copy, electronic)</b>					
5.1 Create maps	90%	90%	94%	98%	98%
5.2 Create maps on computer	90%	90%	94%	98%	98%
5.3 Create charts	90%	90%	94%	98%	98%
5.4 Create tables	90%	90%	94%	98%	98%
5.5 Generate mailing labels	90%	90%	94%	98%	98%
<b>Duty 6: Develop Software Applications</b>					
6.1 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.2 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.3 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.4 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.5 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.6 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.7 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.8 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.9 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
6.10 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
<b>Duty 7: Develop Software Applications</b>					
7.1 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.2 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.3 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.4 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.5 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.6 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.7 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.8 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.9 Develop software applications (e.g., database)	90%	90%	94%	98%	98%
7.10 Develop software applications (e.g., database)	90%	90%	94%	98%	98%

## A-5: Task Analysis

STEPS/Instructions for performing task	PERFORMANCE STANDARDS (Observations/Measurements/Errors)	TOOLS, EQUIPMENT, MATERIALS & OUTPUTS	RELATED RESOURCES (e.g., written lesson, worksheets, data collection)
1 Observe demonstration of GPS usage: GPS menus, satellite information, track, zoom, pan, compass, direction, speedometer, and data collection.	Complete questions of any points of GPS use.	Current GPS (e.g., for software and data), Google Earth Plus or higher.	Introduction of GPS usage and for a 3.15. GPS usage (e.g., for software and data), Google Earth Plus or higher.
2 Receive GPS units and prepare GPS units for use according to GPS instructions.	Demonstrate correct GPS usage according to instructions, including coordinate system.		
3 Receive instruction of features for which data will be collected (e.g., speed, altitude, distance, etc.).			Reference online resources, books, articles.
4 Collect waypoints, routes of interest for these features, and minimum of 4 satellite locations (e.g., GPS, etc.).	Record satellite strength and positional accuracy from GPS.		
5 Observe correct use of software (e.g., Google Earth) displaying data in Google Earth and download and export it back to the software.	Answer questions of any points concerning data downloading and exporting.		
6 Connect GPS to classroom computer using Garmin cable.	Answer display demonstrates that GPS is properly connected.		
7 Display GPS data in Google Earth and evaluate accuracy.	Observe positional accuracy of waypoints.		

## Phase B: Curriculum Design

- ◆ **B-1: Determine Training Approach**
  - Performance/Competency Based
- ◆ **B-2: Develop Learning Objectives**
  - Translate Tasks/Competencies into Objectives (sequence)
- ◆ **B-3: Develop Performance Measures**
  - Knowledge & Skills Assessment tools
- ◆ **B-4: Develop Training Plan**
  - Curriculum Approval

## **B-1: Determine Training Approach**

### **Competency Based Program**

- ◆ Competencies must be made public
- ◆ Criteria for assessment must be clear
- ◆ Accommodate different learning styles & abilities
- ◆ Task performance is primary method of assessment
- ◆ Learners progress at their own speed

## **B-2: Develop Learning Objectives**

### **◆ Performance Objective:**

- specifies final outcome of an instructional activity
- Eg: *Given a Garmin GPS Map 60 and ArcGIS, collect site locations for xxx and display these on a cartography correct map showing xxx*

### **◆ Enabling Objectives:**

- Support achievement of Performance Objective
- Eg: *gain knowledge of: (1)Garmin GPS Map 60, (2)cartography, (3)data transfer to ArcGIS*

## B-3: Develop Performance Measures

### ◆ Knowledge Assessment

- Testing

### ◆ Skills / Performance Assessment \*



SAMPLE 1 - PERFORMANCE FORM

Subject Name		Date	
Teacher Name		Period	
<p><b>OVERALL EVALUATION</b></p> <p>1. The student has met the minimum requirements for this course.</p> <p>2. The student has met the minimum requirements for this course.</p> <p>3. The student has met the minimum requirements for this course.</p> <p>4. The student has met the minimum requirements for this course.</p> <p>5. The student has met the minimum requirements for this course.</p> <p>6. The student has met the minimum requirements for this course.</p> <p>7. The student has met the minimum requirements for this course.</p> <p>8. The student has met the minimum requirements for this course.</p> <p>9. The student has met the minimum requirements for this course.</p> <p>10. The student has met the minimum requirements for this course.</p>			
<p><b>PERFORMANCE STANDARDS</b></p> <p>1. The student has met the minimum requirements for this course.</p> <p>2. The student has met the minimum requirements for this course.</p> <p>3. The student has met the minimum requirements for this course.</p> <p>4. The student has met the minimum requirements for this course.</p> <p>5. The student has met the minimum requirements for this course.</p> <p>6. The student has met the minimum requirements for this course.</p> <p>7. The student has met the minimum requirements for this course.</p> <p>8. The student has met the minimum requirements for this course.</p> <p>9. The student has met the minimum requirements for this course.</p> <p>10. The student has met the minimum requirements for this course.</p>			

## B-4: Develop Training Plan

### ◆ Curriculum Approval

### ◆ Budget

### ◆ Tools, Equipment & Supplies

### ◆ Student Recruitment

### ◆ Staffing

## C: Curriculum Development

### ◆ C-1: Develop Competency Profile

– Map Tasks to Modules / Courses

### ◆ C-2: Develop Learning Guides

### ◆ C-4: Develop Supportive Media

### ◆ C-5: Pilot Test

#### LEARNING GUIDE

PROGRAM TITLE: Child Health Program

SEMESTER: 1st Year LHS Data

#### TASK COMPETENCY: Child Health Data

INTRODUCTION: This learning guide is designed to provide a comprehensive overview of the program and its objectives. It is intended to be used as a reference for students and faculty alike.

#### PROGRAM OBJECTIVE:

Upon completion of this program, students will be able to:

#### LEARNING OBJECTIVES:

1. Understand the importance of child health data.
2. Collect and analyze child health data.

#### PREREQUISITES, IF ANY:

- Basic knowledge of statistics.
- Basic knowledge of child health.

#### Competency Profile

Task	Map to C1	Map to C2	Map to C4	Map to C5
A-1 Define child health concepts (C)				
A-2 Research child health data (C)				
A-3 Develop child health data (C)				
A-4 Define child health concepts (C)				
A-5 Define child health concepts (C)				
A-6 Define child health concepts (C)				
A-7 Define child health concepts (C)				
A-8 Define child health concepts (C)				
A-9 Define child health concepts (C)				
A-10 Define child health concepts (C)				
A-11 Define child health concepts (C)				

## Phases D & E:

## Implementation & Evaluation

### ◆ Faculty Training

### ◆ Evaluate Feedback

### ◆ Document Results

### ◆ Program Update & Improvement

