Evaluation of certifying examination of healthcare information technologists

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History and Purpose

History

- In 2001, JAMI started the task force to foster healthcare information technologist (HIT), who can understand both information technology and healthcare. And from the year 2003, the certifying examination for HIT have started.
- Tests about **information technology**, **health care**, and **health information system** form the certifying exam. The number of questions of these tests are 40, 40, and 60, respectively.
- From the beginning of this exam many persons applied, and by the end of 2006, 5129 persons have been qualified as the primary HIT.

Number of Applicants each year					Number of Persons Certificated as HIT			
Year	**2003**	**2004**	**2005**	**2006**	**2003**	**2004**	**2005**	**2006**
Male	**2623**	**3036**	**3532**	**2949**	**856**	**1055**	**1391**	**1041**
Female	**898**	**767**	**844**	**786**	**123**	**162**	**257**	**244**
Total	**3521**	**3803**	**4376**	**3735**	**979**	**1217**	**1648**	**1285**

Purpose of this paper

- Evaluate the certifying exam by elucidating whether the desired characteristics has been certified by the exam.

The Desired Characteristics of HIT, seen in the general instructive objectives (GIO) of "Information Technology"

- Basic Knowledge about Computer
  - History, Hardware, Software, Programming, ..
- Network Technology
  - OSI model, Basic knowledge about networking, ..
- Database Technology
  - Architecture, Relational DB, SQL, Transaction, Access control, ..
- System Development
  - Design and System Development, DFD, UML, ..
- Operation and Management
  - Recovery and maintenance, Risk management, ..
- Information Security
  - Security Technology, Secure Operation, ..

The Desired Characteristics of HIT seen in GIO of "Health Care"

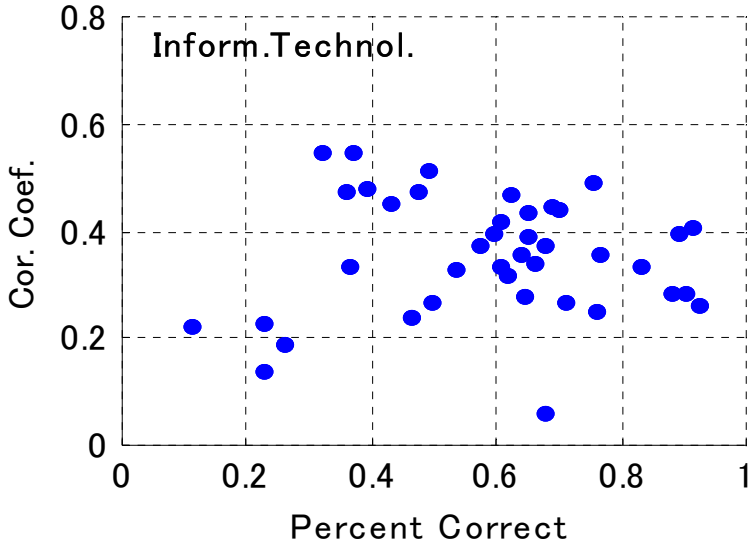
- General Remarks
  - Code of ethics, Informed consent, QOL, ...
- Social System in Medicine
  - Payment system, Insurance, Regulations, ...
- Hospital Management
  - Role of each clinical department, Patient flow, Team medicine, ...
- Social Medicine
  - Systems in public health, ...
- Clinical Medicine
  - Introduction to clinical medicine
- Medical Record
  - POMR, EHR, ...
- Nursing System
  - Nursing chart, ...
- Clinical Examination
  - Blood test, Biochemical test, Blood transfusion, Genetic test, ...
- Safety Management
  - Clinical pass, ...
- Topics
  - Genetic medicine, VR, ..

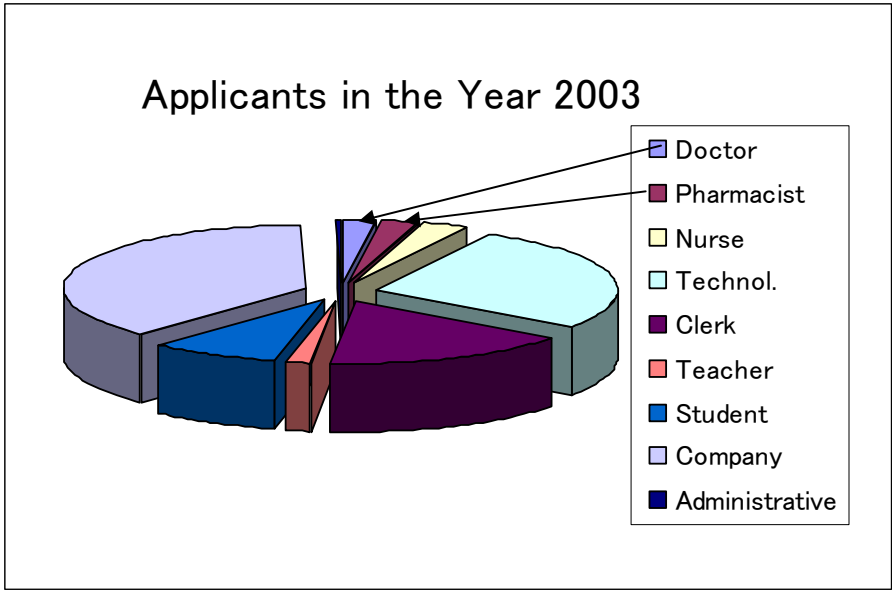
The Desired Characteristics of HIT seen in GIO of "Health Information System"

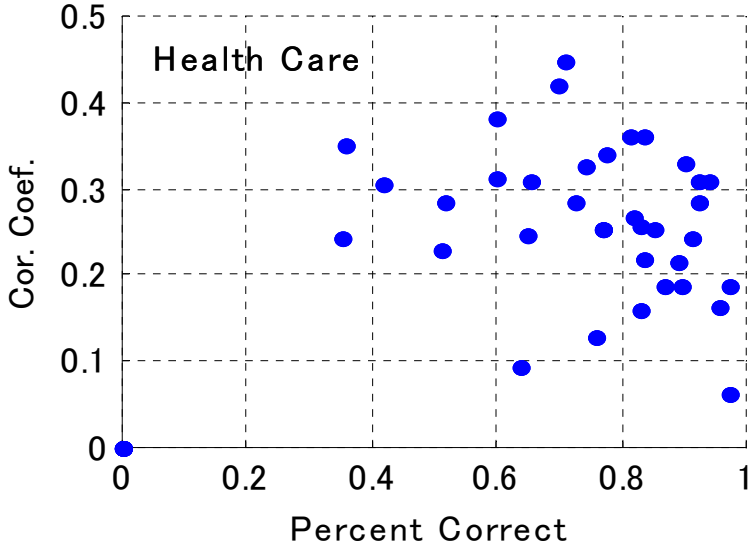
- Characteristics of Health-related Data and System
  - Requirements for health information system, ...
- Issues related to Hospital Information System
  - Explanation of subsystems, ...
  - Design, Development, Install, in practice
  - Practical way in operation, Education, ...
- Wide-area Network in Healthcare
  - Health and welfare system, ...
- Communication, Coordination, Collaboration
  - Role of HIT at the time of system designing, development, negotiation, teaching, daily operations, ...
- Standardization
  - IHE, Security and standardization, ..
- Electronic Health Record
  - Issues related to EHR
- Ethics
  - Code of Ethics, Privacy, ..
- Evaluation of Clinical Data
  - Data mining, Statistics, ...

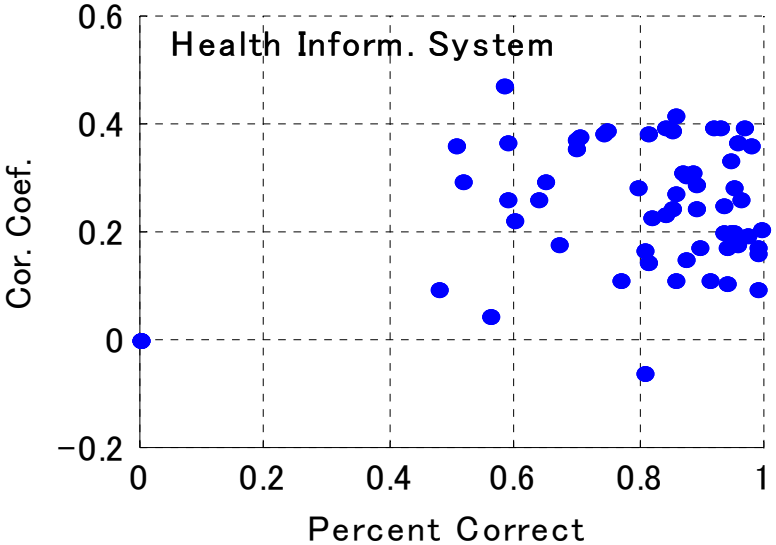
Results of the first certifying exam

As the scores of percent correct of many questions exceed 0.8, it was known that we can ask more to HIT, here Cor. Coef. is the correlation coefficient between the score of each question and the total score of that exam.

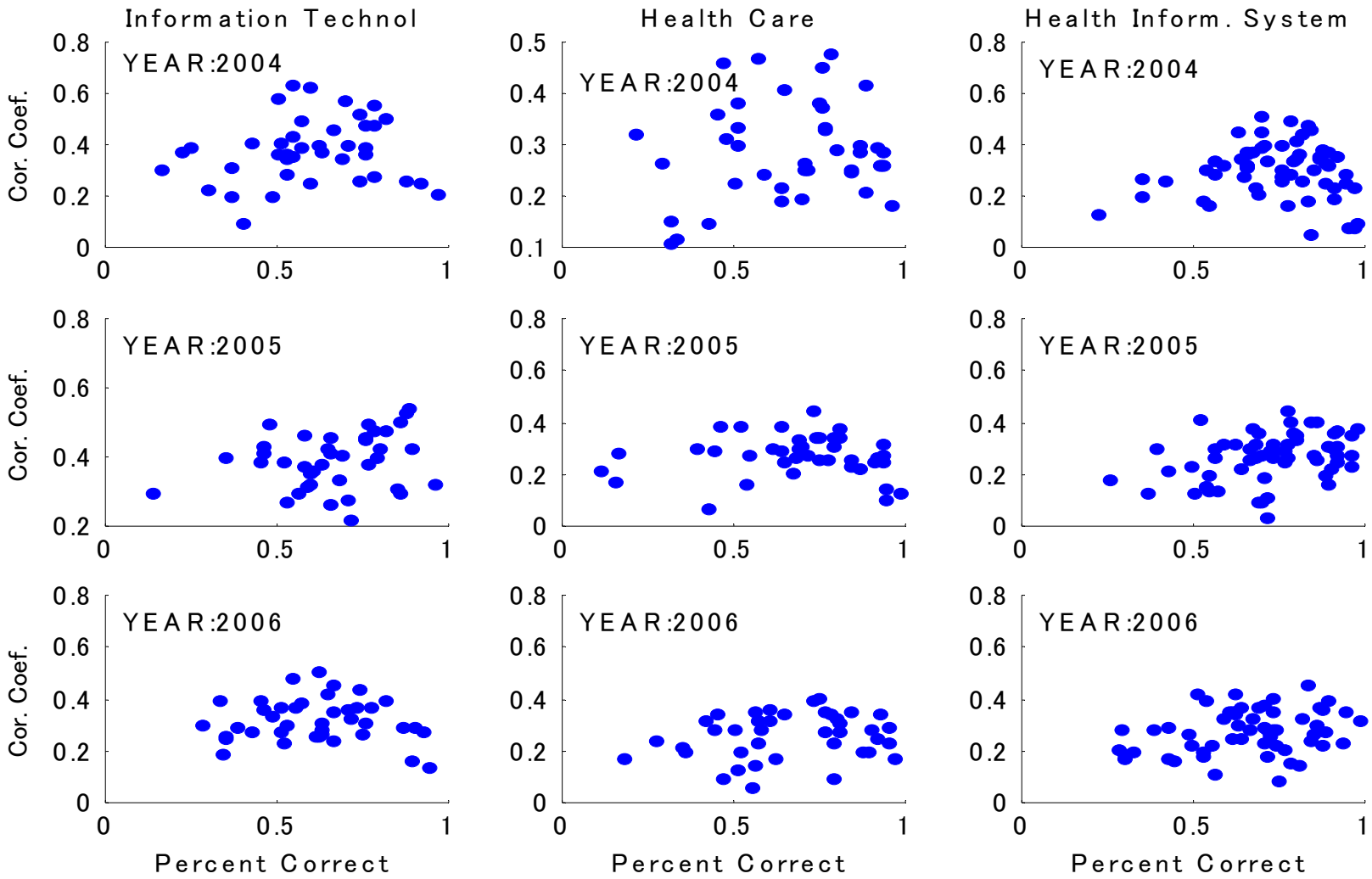








Correlation Coefficient vs. Score of Percent Correct for new Applicants each year



Method and the Categories used in the evaluation

Method

Under GIO, the specific behavioral objectives (SBO) were made. According to SBO, questions were created to measure abilities that HIT should have. As each question always treats one theme, we can categorize the objectives of each question. Seven categories were chosen as listed in the right, and questions were selected in accordance with these categories.

As this is the exam for primary HIT, a few questions are categorized into 5,6 or 7. To avoid distortions caused by the different number of questions we selected at most 3 questions to each category in each test. The selection of these 3 questions is done by the difficulty measure, i.e., average score of each question normalized to the allotted score.

Using the data of the new applicants who first apply the exam, average score of percent correct to each category in each test was evaluated, which are then used to know what category contributes most to the certification of HIT.

Categories

1: **Ability to follow logic**
- **Flow Chart, Binary Mathematics, ...**

2: **Computer Literacy (Knowledge)**
- **Terminology**

3: **Medical Knowledge**
- **Common sense about clinical medicine, ...**

4: **Knowledge about hospital management**
- **Insurance, formulas used in hospital management, …**

5: **Decision with Ethical Mind**
- **Privacy, Security, Code of Ethics, …**

6: **Behavior at the Time of Emergency**
- **Ask best choice or priorities in the time of troubles**

7: **Ability to evaluate/understand Clinical Data**
- **Understand figures or tables describing some clinical status, introductory knowledge about medical statistics**

Results

The percentage of the number of applicants who passed or failed the exam are listed in the "Passed" or "Failed" cell. These percentages were taken to the total number of applicants with the same range of average score.

- 1:Ability to follow logic

Score	Cases	Passed	Failed
0.00–0.25	3396	14.22	85.78
0.25–0.75	5816	30.38	69.62
0.75–1.00	557	52.06	47.94

- 2: Computer Literacy (Knowledge)

Score	Cases	Passed	Failed
0.00–0.25	2298	7.57	92.43
0.25–0.75	6135	26.21	73.79
0.75–1.00	1336	56.74	43.26

- 3:Medical Knowledge

Score	Cases	Passed	Failed
0.00–0.25	1578	16.60	83.40
0.25–0.75	5102	29.18	70.82
0.75–1.00	814	46.93	53.07

- 4:Knowledge about hospital management

Score	Cases	Passed	Failed
0.00–0.25	2080	14.57	85.43
0.25–0.75	6672	27.01	72.99
0.75–1.00	2612	47.47	52.53

Results (continued)

- 5:Decision with Ethical Mind

Score	Cases	Passed	Failed
0.00–0.25	142	4.23	95.77
0.25–0.75	5122	19.37	80.63
0.75–1.00	6100	38.48	61.52

- 6:Behavior at the Time of Emergency

Score	Cases	Passed	Failed
0.00–0.25	34	0.00	100.00
0.25–0.75	4381	16.91	83.09
0.75–1.00	6935	37.55	62.45

- 7:Ability to evaluate / understand Clinical Data

Score	Cases	Passed	Failed
0.00–0.25	852	10.33	89.67
0.25–0.75	8745	27.11	72.89
0.75–1.00	1767	50.14	49.86

Category	Average	Median	Mode
1	0.32	0.33	0.33
2	0.45	0.39	0.33
3	0.44	0.39	0.33
4	0.55	0.56	0.50
5	0.76	0.80	1.00
6	0.79	0.83	1.00
7	0.58	0.58	0.75

Results (continued) and Discussions

- Logistic regression analysis (dependent variable is the result of exam)

Category	Coef. B ±SE	Wald statistic	estimated odds ratio		
			exp(B)	95% confidence interval	
1	1.48±0.143	107.6	4.40	3.32	5.82
2	2.44±0.148	272.4	11.47	8.58	15.32
3	1.54±0.150	105.5	4.69	3.49	6.30
4	4.58±0.212	465.2	97.75	64.46	148.24
5	3.96±0.261	230.8	52.57	31.53	87.65
6	3.46±0.250	191.4	31.78	19.47	51.87
7	2.59±0.218	141.6	13.36	8.72	20.47

- Discussions
  - The results of logistic regression analysis would mean that the certifying exam will be very sensitive to select persons who have good knowledge about hospital management, having ethical mind, and conduct well at the time of emergency. But the knowledge about clinical medicine may not be so important. All of these characteristics are those we have expected to primary HIT.

Contact Detail

- References
  - Science in Test Theory "TEST NO KAGAKU" in Japanese, Kaname Ikeda, eds. 1992

- Contact Detail

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