

# Comparison of Written Examinations Required for Dental Licensure in Japan and the United States: Contents, Cognitive Levels, and Cultural Implications

**Takashi Komabayashi, D.D.S., Ph.D.; William F. Bird, D.D.S., M.P.H., Dr.P.H.**

*Abstract:* The goal of this article is to describe differences between the written examinations required for dental licensure in Japan and in the United States. Candidate guides, old exams, and other published data pertaining to the Japan National Examination for Dentists (NED) and the U.S. National Board Dental Examination (NBDE) were used. Dental education in Japan consists of a six-year program following high school graduation. The U.S. counterpart is usually a four-year program following a bachelor's degree. The NED, which is made up of 330 questions, is a single, all-important gatekeeper test that immediately grants licensure to practice dentistry throughout Japan. The NED contains no evaluation of technical skills; it is purely a written exam. By contrast, in the United States, the NBDE Parts I and II, which consist of 900 questions, are only components of a three-step licensure process. An additional state or regional board examination on technical skills is required to obtain licensure to practice. There are 400 basic science questions on the NBDE Part I, while the NED has thirty. In terms of cognitive level, questions on the NED place more emphasis on recall, while those on the NBDE Part II are more focused on problem solving. The outcomes of this comparison provide dental educators with comparisons of the licensure examination process for Japanese and U.S. dentists.

Dr. Komabayashi is a Class of 2005 student in the International Dentist Program and Staff Research Associate, Department of Preventive and Restorative Dental Sciences, and Dr. Bird is Clinical Professor and Associate Dean, Clinic Administration Director, International Dentist Program—both at the School of Dentistry, University of California, San Francisco. Direct correspondence and requests for reprints to Dr. Takashi Komabayashi, University of Connecticut Health Center, School of Dental Medicine, 263 Farmington Ave., Farmington, CT 06030-1715; 860-679-2724 phone; 860-679-2208 fax; 1CD38179@nifty.com.

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Worldwide, dentists actively participate in international endeavors via journals, books, academies, seminars, and researcher exchanges. Knowing the basis for licensure in each country is helpful in these international activities. There are some published studies of written examinations in specific countries, particularly in the United States; however, little comparative information on the written examinations required in different countries is available.<sup>1-9</sup> Therefore, this article reports the differences in written examinations required for dental licensure in Japan and the United States.

In the United States, dental education usually is conducted as a four-year program following a

bachelor's degree. The curriculum varies among U.S. dental schools, but first- and second-year studies usually focus on courses in the biomedical sciences and preclinical technical laboratory skills. The majority of instruction in clinical dental subjects is provided in the third and fourth years. Didactic material in dental subjects is supplemented by clinical experience under the supervision of dental faculty. U.S. dental students usually take Part I of the National Board Dental Examination (NBDE), which consists of four sections covering the basic biomedical sciences and dental anatomy, at the end of the second year. NBDE Part I must be passed before NBDE Part II is attempted. Students usually take NBDE Part II, which consists of a comprehensive case-based ex-

amination covering clinical dental subjects, pharmacology, behavioral science, dental public health, and occupational safety, in the fall semester of the fourth year. NBDE Parts I and II are comprised exclusively of multiple-choice questions, and more than two opportunities to take the exams are offered each year. An additional state or regional board examination for technical skills is required for licensure to practice. U.S. state or regional board examination candidates must have passed the NBDE Parts I and II before receiving a license to practice. Some U.S. dental schools also require passing both NBDE Parts I and II before graduation.

In July 2000, 3,808 U.S. dental students took the NBDE Part I, with a 91.7 percent pass rate (3,491 students). In December 2000, 3,399 U.S. dental students took the NBDE Part II, with a 93.8 percent pass rate (3,190 students). Published minimal passing correct answers for NBDE Part I (July 2000) and Part II (December 2000) were 187 of 400 and 275 of 500, respectively.<sup>10</sup> High scores on the NBDE Parts I and II are very important for students who apply for postgraduate specialty programs in such fields as orthodontics and endodontics.

Japanese dental education consists of a six-year program following high school graduation. Japanese dental students engage in didactic and laboratory coursework in the first four years. Fifth-year dental students spend 80 percent of their time in direct clinic patient care and 20 percent of their time in didactic study. Sixth-year dental students participate exclusively in patient care and prepare for the nationwide dental licensure examination, the Japan National Examination for Dentists (NED). Sixth-year dental students are eligible to take the NED right before graduation. The Ministry of Health, Labour, and Welfare administers the NED annually only in March. The NED is a multiple-choice, two-day written test to assess the knowledge and techniques required for practicing dentistry in Japan. The NED results are reported on a pass/fail basis with scores. The NED immediately grants licensure to practice dentistry anywhere in Japan, and no examination to evaluate technical skills is administered.

In March 2004, 2,960 Japanese dental students took the NED, with a 74.2 percent pass rate (2,197 students). The estimated minimal passing correct answers were 204 of 330 (March 2002).<sup>11</sup> Retakes of the NED are permitted without remediation; however, the NED can be taken only in March. Thus, the candidates who fail are required to wait a whole year before making another NED attempt. The Japanese

system differs from that of the United States in that eligibility for licensure in Japan is based on a single written test, while U.S. licensure is based on successful completion of three examinations: NBDE Part I, NBDE Part II, and a state or regional board examination.

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## Materials and Methods

This section reports a comparison of the content and cognitive level of measurement of the NBDE and the NED. The most recent NBDE and NED exams are not available because test administrators in both countries collect test booklets at the end of the exam. Therefore, candidate guides, released old exams, and other published data for the NBDE and NED were used for this comparison.<sup>12-15</sup> These materials were carefully reviewed, and comparisons were made of question content and cognitive levels. Test Construction Committees completed classification of test content by cognitive level for NBDE Part II during the final phase of test construction. We obtained the report "Origins and Purpose of the National Board Dental and Dental Hygiene Examinations 2002" directly from American Dental Association. The content level of classification for the NBDE Part II (March 2001) was based purely on this report (pages 47-50).<sup>10</sup> Three types of cognitive levels were distinguished in this classification: application, problem solving, and recall. Standard definitions are as follows. "Application" is to use information in a new or unfamiliar situation. The question and answer are linked to a specific patient problem or disease. "Problem solving" is to analyze data and make decisions or predictions. The question presents a clinical situation that requires a decision. "Recall" is to recall a fact from memory. The goal is to assess the learner's recall of facts and principles without reference to a patient care situation or disease process.<sup>16,17</sup>

The content level of classification for the NED was not available in Japan. However, the NED released examination (March 2002), which was published by Gakken-Shoin Ltd., was available. The NED released examination was written in Japanese and was similar to National Board Dental Examination reprints Parts I and II, which were distributed by the American Student Dental Association with permission from the American Dental Association. As the authors of this article, one of whom (TK) was a recent test taker in Japan, we classified the cognitive level of questions on the Japanese NED. The

NED released examination (March 2002) was used to conduct its classification. The cognitive level classification was exclusively focused on NBDE Part II and the corresponding portions of the NED. NBDE Part I and the basic science/compulsory questions in the NED were excluded because of lack of information on test construction.

## Results

A comparison of written examination content for the NBDE and the NED is shown in Table 1. The numbers of total test items in NBDE Parts I and II were 400 and 500, respectively, while the number of total test items on the NED was 330. There were 400 basic science questions in the NBDE Part I, while the NED had thirty. A unique feature of the NED is a section of compulsory questions, which includes all fields of dentistry, including ethics. This section includes thirty questions, and examinees are required to answer 80 percent correctly. Within the thirty questions, one or two mandatory questions must be answered correctly. If an examinee incorrectly answers even one of these items in the compulsory section, the examinee fails the entire NED even if the other twenty-nine answers are correct. In short, achieving less than 80 percent on the compulsories or missing the one or two mandatory questions results in complete failure of the entire NED regardless of performance on the exam as a whole. The nature of the compulsory questions is to rule out the examinee who lacks basic medical and dental knowledge. The reason why this section exists as a subunit of the entire

exam is to assess decision-making ability under stress.

Table 2 shows content classified by cognitive level for the NBDE Part II and corresponding NED. Items at the cognitive level of problem solving accounted for 19.6 percent of the NED test items. This was lower than in the NBDE Part II, in which 47 percent of the items were problem-solving items. Thus, items at the problem-solving cognitive level appeared to be the highest priority for test takers in the NBDE Part II but the lowest in the NED. Application and recall items accounted for 31.9 and 42.2 percent, respectively, of all items on the NED. This was higher than in the NBDE Part II, where such items accounted for 20.4 and 32.6 percent, respectively, of all test items. Thus, the order of distribution of items by cognitive level in NBDE Part II, from most frequent to least frequent, is problem solving, recall, and application, while that in the NED is recall, application, and problem solving. Table 3 shows the summary of percentages in cognitive level.

## Discussion

This research was prompted by the personal experience of one of the authors (TK), who completed both the Japanese NED and the U.S. NBDE Parts I and II and recognized substantial differences between them. However, these differences proved difficult to explain objectively because of different languages, cultures, and educational systems in the two countries. Therefore, in this study, we focused on content and cognitive level to determine what differences exist. The observations about differences in licensure testing in Japan and the United States are personal opinions and not based on any sociological/cultural studies or official test construction philosophy of the organizations that create either the NED or the NBDE. They represent the perspectives of the lead author who has experienced dental education in both countries.

**Table 1. Comparison of written examination content in NBDE (U.S.) and NED (Japan)**

Content		NBDE (U.S.)	NED (Japan)
NBDE	Anatomic Sciences	100	*
Part I	Biochemistry & Physiology	100	*
	Dental Anatomy & Occlusion	100	*
	Microbiology & Pathology	100	*
	<b>Part 1 subtotal</b>	<b>400</b>	<b>30</b>
NBDE	<i>COMPONENT A (Discipline-based test items)</i>	400	120
Part II	<i>COMPONENT B (Patient case)</i>	100	150
	<b>Part 2 subtotal</b>	<b>500</b>	<b>270</b>
	<b>Compulsory Questions</b>	-	<b>30</b>
	TOTALS	900	330

\*Basic science questions on the NED include Anatomic Sciences, Biochemistry & Physiology, Dental Anatomy & Occlusion, and Microbiology & Pathology.

**Table 2. Content classified by cognitive level in the NBDE Part II (March 2001) and NED (March 2002)**

	NBDE (U.S.) Part II (March 2001) Cognitive level					NED (Japan) (March 2002) Cognitive level				
	Items	Application	Problem solving	Recall	NA	Items	Application	Problem solving	Recall	NA
<b>COMPONENT A (Discipline-based)</b>										
Operative Dentistry	43	8	18	17		2	1	3		
Periodontics	39	9	20	10	0	25	3	1	4	1
Endodontics	27	8	14	5		4	1	5		
Prosthodontics	41	3	27	11	0	24	9	7	8	0
Orthodontics						16	6	1	9	0
Pediatric Dentistry	61	7	30	24	0	15	3	2	7	3
Oral and Maxillofacial Surgery and Pain Control	43	12	25	6	0	25	7	5	13	0
Oral Diagnosis *	56	22	17	17	0	#	-	-	-	-
Patient Management **	48	8	7	33	0	7	1	2	4	0
Pharmacology	42	1	11	30	0	#	-	-	-	-
Dental materials	-	-	-	-	-	8	0	2	6	0
<b>Total – Component A</b>	<b>400</b>	<b>78</b>	<b>169</b>	<b>153</b>	<b>0</b>	<b>120</b>	<b>35</b>	<b>22</b>	<b>59</b>	<b>4</b>
<b>COMPONENT B (Patient case)</b>										
Operative Dentistry							5	2	1	
Periodontics						27	5	1	5	
Endodontics							7	1	0	0
Prosthodontics						24	8	9	7	0
Orthodontics	***	***	***	***	***	9	7	2	0	0
Pediatric Dentistry						10	6	0	4	0
Oral and Maxillofacial Surgery and Pain Control						30	9	10	11	0
Oral Diagnosis *						#	-	-	-	-
Patient Management **						#	-	-	-	-
Pharmacology						#	-	-	-	-
<b>Total – Component B</b>	<b>100</b>	<b>24</b>	<b>66</b>	<b>10</b>	<b>0</b>	<b>100</b>	<b>47</b>	<b>25</b>	<b>28</b>	<b>0</b>
Introduction of dental treatment & dental jurisprudence #; NED (JAPAN) -C	0	-	-	-	-	50 (#total)	4	6	27	13
<b>Totals (A+B+C)</b>	<b>500</b>	<b>102</b> (20.4%)	<b>265</b> (47.0%)	<b>163</b> (32.6%)	<b>0</b> (0%)	<b>270</b>	<b>86</b> (31.9%)	<b>53</b> (19.6%)	<b>114</b> (42.2%)	<b>17</b> (6.3%)

NA: Not Available/impossible to classify

#These disciplines are distributed in various parts in NED (Japan) and summarized in C.

\*Oral pathology and radiology are main topics in NED (Japan).

\*\*Behavioral science, dental public health, and occupational safety are main topics in NED (Japan).

\*\*\*Case-based questions in NBDE Part II include operative dentistry, periodontics, endodontics, prosthodontics, orthodontics, pediatric dentistry, oral and maxillofacial surgery and pain control, oral diagnosis, patient management, and pharmacology.

Patient case problems—a case-based component that contains questions about various aspects of a patient’s dental care provided with dental chart, radiographs, and photographs—were emphasized more in the NED than in the NBDE. The number of pa-

tient case problems was 150 of 330 questions in the NED and 100 of 900 total questions in the complete NBDE Parts I and II, respectively. Thus, nearly half of the NED questions are based on patient case problems. Patient case problems in the NBDE II were

**Table 3. The summary of percentages in cognitive level.**

	NBDE II	NED
Recall	32.6	42.2
Application	20.4	31.9
Problem Solving	47.0	19.6

designed according to a more standard format than those in the NED and thus included more questions at the reasoning level. On the other hand, basic science questions were emphasized more in the NBDE than in the NED. The numbers of basic science questions were 400 of 900 and 30 of 330 in the complete NBDE and the NED, respectively. In addition, dental jurisprudence and compulsory questions were included in the NED, while not in the NBDE. The focus on dental jurisprudence and compulsory questions in the NED may reflect the fact that it is the only test required for dental licensure in Japan, whereas state dental boards grant licensure in the United States.

Many dental education reforms are currently under way in Japan. For example, a new nationwide examination is being developed for dental students who will begin their clinical rotations as student dentists. Although it is currently under development, the exam is intended for computer-based testing (CBT) and could be similar to the NBDE Part I. Dental schools in Japan are additionally developing syllabi and objective methods to evaluate student performance. The Objective Structured Clinical Examination (OSCE) is a current topic of discussion in Japanese dental education. Mandatory internship in a postgraduate clinical training course will be required for new dentists in Japan starting in 2006.<sup>18-24</sup>

In terms of cognitive level, a limitation of the information reported in this article is that the validity of item classification was not established because the number of people who have completed both the NBDE and the NED is small. Thus, some items (6.3 percent) were impossible to classify. The differing emphasis in the cognitive levels of the questions in the NED and the NBDE might be related to the different educational cultures and licensure processes in the two countries. To understand differences in cognitive level, one should consider not only dentistry but also cultural differences between Japan and the United States.

First, questions requiring problem solving predominated in the NBDE Part II and were the least

frequent type in the NED. Culturally, U.S. students like to ask questions while their Japanese counterparts are typically quiet and polite and tend not to disagree or ask questions.<sup>25</sup> In addition, concepts regarding health and disease in Asia are unique. Most health beliefs and practices are learned and practiced in the home, and professional help is only sought when home remedies fail.<sup>26</sup> Many Japanese patients come to a dental clinic at the last minute and say, "I have cavities in my back teeth and need fillings." Many U.S. patients behave in a similar fashion; however, the situation in Japanese dental clinics is different from their U.S. counterparts. For example, it is not unusual that a dentist in Japan can have more than thirty patients a day. Depending on the nature of treatment, patients usually sit in the dental chair less than half an hour. Efficiency and time management are the key for success for Japanese practitioners. In such situations, less problem solving is required. Second, questions requiring recall were the most frequent in the NED and the second most frequent in the NBDE Part II. The Japanese have very high anxiety about life because of the need to save face. The pressure to study and to get good grades is very intense. In addition, the passing rate of the NED in March 2004 was 74.2 percent. Retakes of the NED are permitted without remediation; however, the NED can only be taken in March, which places much pressure on test takers. In Japanese culture, education overall has focused on memorization with little emphasis on problem solving. Third, application was the least frequent type of question in the NBDE Part II but the second most frequent in the NED. Application of technical and diagnostic skills is covered in the state or regional examination in the United States; thus, it is reasonable that the number of application questions on the NBDE is limited.

Dental education in Japan is taught in Japanese, a complex and subtle language. Over 99 percent of the population consists of native-born Japanese. The Japanese generally resist outside influences but are open to new ideas generated from within their own culture. They are subjective and experiential in their thinking, holding fast to traditional values. Strong loyalty to their groups makes the Japanese look to the particular and specific rather than the universal and abstract. Decisions in Japanese culture are made within the group with little or no personal recognition in Japanese culture compared with the very individualistic American culture. The culture in the United States is very diverse. It is very analytical, and new concepts are adopted quickly. Inno-

vation often takes precedence over tradition. Excellence and decisiveness are prized characteristics.<sup>27</sup> Understanding these cognitive styles may be helpful to enhance understanding of the characteristics found in this study.

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## Conclusion

The results obtained in this study may enable faculty to develop curriculum and provide effective instruction for licensure examination preparation for students in Japan and the United States. The subject analysis of transcripts is sometimes the only measure used to interpret foreign dental education. However, that interpretation does not provide understanding of cultures and philosophies in dental education or licensure examination. The practical implication of this study is that the methods used are objective, and thus this research methodology can apply to comparisons of licensure examination with other countries. Learning more about the licensing requirements in other countries makes the transition easier between countries. The appreciation of the level of knowledge and technical skills, which an examination candidate already possesses, identifies cultural differences and thus facilitates recommendations for curriculum development. Faculty in U.S. dental schools may benefit from considering the educational background and licensure methods of international dentists when considering them for admission into advanced education programs and research collaboration. This article will help advance international understanding and contribute to world dental education.

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## REFERENCES

1. Houston JB, Menish IN. Multiple regression of predictors and criteria of dental school performance. *J Dent Res* 1975;54(3):515-21.

2. Kramer GA. Predictive validity of the Dental Admission Test. *J Dent Educ* 1986;50(9):526-31.
3. Rinchuse DJ, Zullo T, Rinchuse DJ. The cognitive level demands of the National Board Dental Examination. *J Dent Educ* 1987;51(9):543-5.
4. Schwarz E. Dental treatment provided to young adult Danes enrolled in alternative dental programs during a 3-year period. *Acta Odontol Scand* 1989;47(3):159-65.
5. Kramer GA, DeMarais DR. Reliability and validity of the pilot National Board Dental Examination. *J Dent Educ* 1992;56(4):236-41.
6. Kramer GA, DeMarais DR. Setting a standard on the pilot National Board Dental Examination. *J Dent Educ* 1992;56(10):684-8.
7. Kramer GA, Neumann LM. Confirming the validity of Part II of the National Board Dental Examination: a practice analysis. *J Dent Educ* 2003;67(12):1286-98.
8. Ranney RR, Gunsolley JC, Miller LS. Comparisons of National Board Part II and NERB's written examination for outcomes and redundancy. *J Dent Educ* 2004;68(1):29-34.
9. Stewart CM, Bates RE Jr, Smith GE. Does performance on school-administered mock boards predict performance on a dental licensure exam? *J Dent Educ* 2004;68(4):426-32.
10. Origins and purpose of the National Board Dental and Dental Hygiene examinations, 2002. Chicago: American Dental Association, 2002:47-50.
11. Takazoe I. Recent changes in the dental curriculum in Japan. *Int Dent J* 1998;38:252-4.
12. National Board Dental Examination candidate guide, parts I and II, 2002. Chicago: American Dental Association, 2002.
13. Announcement for the candidate guide of the 96th National Examination for Dentists. Ministry of Health, Labour, and Welfare of Japan, August 2002.
14. National Board Dental Examination reprints Part I and II (IA-IJ, IIA-IIK). Chicago: American Student Dental Association.
15. National Examination for Dentist. Old examinations. Gakken-Shoin Ltd., 2002. (In Japanese.)
16. Bloom BS. Taxonomy of educational objectives: the classification of educational goals. Handbook I, cognitive domain. New York: Longmans, Green, 1956.
17. Case SM, Swanson DB. Constructing written test question for the basic and clinical sciences. Philadelphia: National Board of Medical Examiners, 2001.
18. Heo S-M, Kim K-J, Kawamura M, Komabayashi T. Comparison of the dental education systems in Korea and Japan. *Int Dent J* 2004;54(2):70-2.
19. Kimura Y, Miyashira H, Hasegawa T, Watanabe H, Kakuta S, Suganuma T, et al. "Tooth examination" as a subject of OSCE for assessment of undergraduate students at the end of clinical dental education. *J Jpn Dent Educ Assoc* 2004;19(2):249-58 (in Japanese).
20. Harden RM, Stevenson M., Downie WW, Wilson GM. Assessment of clinical competence using objective structured examination. *Br Med J* 1975;21(5955):447-51.
21. Gerrow JD, Boyd MA, Duquette P, Bentley KC. Results of the national Dental Examining Board of Canada written examination and implications for certification. *J Dent Educ* 1997;61(12):921-7.

22. Ogawa T, Taguchi N, Sasahara H. Assessing communication skills for medical interviews in postgraduate clinical training course at Hiroshima University Dental Hospital. *Eur J Dent Educ* 2003;7(2):60-5.
23. Okiji T, Fukushima M, Yoshihara A, Kota K, Ono K, Kobayashi H. Introduction of OSCE for assessment of clinical competence in undergraduate dental education at Niigata university school of dentistry. *J Jpn Dent Educ Assoc* 2003;18(2):249-58 (in Japanese).
24. Amano H, Sano T, Gotoh K, Kakuta S, Suganuma T, Kimura Y, et al. Strategies for training standardized patient instructors for a competency exam. *J Dent Educ* 2004;68(10):1104-11.
25. Lipson JG, Dibble SL, Minarik PA. *Culture and nursing care: a pocket guide*. San Francisco: UCSF Nursing Press, 1996:180-90.
26. Schwarz E, Lo ECM. Oral health and dental care in Hong Kong. *Int Dent J* 1995;45:169-76.
27. Morrison T, Conaway WA, Borden GA. *Kiss, bow or shake hands: how to do business in sixty countries*. Avon, MA: Adam Media Corporation, 1994:202-8,405-11.