Internal Consistency and Reliability of a Questionnaire Assessing Organizational Innovation in Two Schools of Dentistry

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Abstract: The objective of this study was to test the internal consistency and test-retest reliability of a questionnaire designed to assess the status of and factors associated with organizational innovation in schools of dentistry. The questionnaire included thirty-three questions that assessed the following six domains: innovation/environment, innovation/leadership, innovation/personal, feedback/environment, feedback/personal, and feedback/interpersonal. A seventh domain, evidence-based learning, assessed the reaction of dental faculty to a scenario where the scientific evidence found a current treatment to be ineffective in improving the health status of patients. The questionnaire was mailed three times to a systematic sample of fifty-six dental faculty working at a research-intensive dental school (RES) and all thirty-nine dental faculty working at a dental school where the emphasis is on clinical education (CL). The two U.S. dental schools had similar numbers of students; however, they differed significantly in their research portfolios. The response rate was 70.5 percent. The seven domains had alpha coefficients ranging between 0.60 and 0.89. The test-retest reliability for the seven domains ranged between 0.65 and 0.92. Dental faculty of the RES school had significantly higher average scores than faculty of the CL school on innovation/leadership, innovation/environment, feedback/environment, and feedback/personal domains. Regression analyses found no differences between the two schools in innovation/environment scores. The innovation/environment scores were significantly associated with innovation/leadership, feedback/environment, feedback/interpersonal, and age. The evidence-based learning domain was negatively associated with the innovation/environment domain, indicating that faculty who were willing to abandon teaching of a treatment found to be ineffective felt that their school environment was not highly innovative. In conclusion, this preliminary study found that the questionnaire reliably assessed six domains representing innovation and feedback. This preliminary study also found that an innovative environment in two schools of dentistry is associated with presence of leaders who promote change and innovation, an environment that encourages feedback, and faculty members who value interpersonal feedback.

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At its essence every organization is a product of how its members think and interact,” say Ross et al.1 “Thus, the primary leverage for any organizational learning effort lies not in policies, budgets, or organizational charts, but in ourselves.”

Schools of dentistry have faced several challenges and opportunities during the last twenty years. For example, they have experienced demands from university administrators for increased financial independence; changes in the gender and racial/ethnic mix of applicants to schools of dentistry; a shortage of qualified faculty; and pressures to integrate as academic centers within a university environment. There also have been many opportunities for innovation and progress in dental education. A major opportunity for schools of dentistry is the current recognition that oral health may impact on the general health and social well-being of individuals and societies. Another advantage for dental education is the prediction that dentistry as a profession will remain in demand by applicants for professional education for the foreseeable future.²

Realizing new opportunities and facing challenges require setting dynamic visions and building learning organizations in schools of dentistry. A
learning organization attempts to develop environments, shared visions, mental models, rewards, and systems that promote collective learning by all members of the organization. Members working in a learning organization feel ownership and responsibility.\textsuperscript{3–5} It has been assumed that learning organizations are best suited to self-critique, react positively to feedback, and develop and implement new ideas or innovations to prepare them to face current and anticipated challenges.\textsuperscript{3–5} Schools of dentistry can be considered organizations that include students, staff, faculty, and patients who work in a system to achieve defined missions. The stakeholders in schools of dentistry are influenced by internal and external environments and organizations.

The main mission of schools of dentistry is to prepare competent practitioners. This focus, unfortunately, of dental education has created an organizational environment in which the emphasis is on learning using well-tested and -tried methods. Innovation and change are less likely to be embraced in such educational environments because the emphasis is on developing contemporary practical skills within a finite, and relatively short, period of time. However, dental practice like all other aspects of health care is facing technological and biological revolutions. Change is inevitable, and dental schools as well as their graduates should be able to face and deal with challenges using innovation, new ideas, and new operational systems. There is an urgent need to study and analyze how best to develop educational and management systems in dental schools that encourage innovation. Achieving this goal may depend on developing organizations with dynamic and innovative visions and faculty who are willing to learn, change, and take risks.\textsuperscript{3–6}

Unfortunately, we did not find any study evaluating organizational environments of schools of dentistry. A recent review of curricular change in medical schools also reached that conclusion. In that review, the authors reported that they “were surprised by the relatively small number of sources available that addressed the characteristics of successful curricular change in higher education in general, and in the professional education of physicians.”\textsuperscript{7} The paucity of evidence was also noted in a pivotal review of the reasons for resistance to change in medical schools.\textsuperscript{8} In that review, the conflict between the espoused theory that medical schools have a humanistic vision and the theory-in-practice where research and only research is valued was hypothesized as a major reason why medical educators have been resistant to change.\textsuperscript{8}

In industry, there is a wealth of scientific research on the determinants of change and innovation in organizations (for example, Ramer, \textsuperscript{9} Luckenbill-Brett,\textsuperscript{10} Williams and Williams,\textsuperscript{11} Shane et al.,\textsuperscript{12} Delaney et al.,\textsuperscript{13} Edmonston,\textsuperscript{14} Burpitt and Bigones,\textsuperscript{15} Tesluk et al.,\textsuperscript{16} Simonin,\textsuperscript{17} and Zhou\textsuperscript{18}). However, this body of knowledge has not yet been applied to schools of dentistry or universities. Academic institutions have the same basic components as nonacademic organizations: a management structure (deans, chairs, and division heads); core staff (faculty and support staff); and customers (students, patients, and policymakers). Schools of dentistry also face the same positive and negative influences on their organizational environments as do nonacademic organizations.

Using information from other fields on determinants of innovation and changes in organizations,\textsuperscript{3–5} we designed a questionnaire that assesses how dental faculty perceive their organizational and personal environments. Argyris\textsuperscript{3} and Senge\textsuperscript{4,5} proposed that for an organization to innovate and change requires the development of personal skills and mental models that accept giving and receiving feedback, questioning of assumptions, and accepting rather than rejecting change. Innovative organizations seek and prepare for future events and they constantly re-evaluate their goals and methods of operation. A successful organization needs to promote high levels of acceptance of these positive behaviors and promote the shedding of negative behaviors such as avoidance of conflicts, selfishness and self-enhancement, defensive behaviors, struggles for control, and blaming of others. Innovative or learning organizations have members who continuously and openly examine all programs, assumptions, and work environments. Such organizations also strive to match espoused values with actual practices and decisions\textsuperscript{19} and expose and study failures because errors and mistakes open the opportunity to re-examine and challenge the assumptions used in day-to-day operations.\textsuperscript{20}

These concepts were used to develop a questionnaire suited for academic organizations. The questionnaire assessed the following seven domains (Table 1): 1) the innovative status of a school environment (innovation/environment); 2) vision of leadership vis-à-vis innovation (innovation/leadership); 3) personal perspective on innovation (innovation/personal); 4) acceptance and seeking of feedback
within the school (feedback/environment); 5) personal acceptance and seeking of feedback (feedback/personal); and 6) an environment where faculty members provide open feedback to their colleagues and leaders of the institution (feedback/interpersonal). A seventh group of questions assessed the respondent’s reaction to a scenario in which the evidence clearly indicates that a procedure currently taught to students is not effective in improving oral health (evidence-based learning). The innovation/environment domain is considered the major outcome variable in this study because the goal of any attempt to initiate change in dental organizations requires the development of an environment in which innovation is welcomed and sought by all stakeholders. We do not know the determinants of developing an innovation-friendly environment in schools of dentistry; hence, we hypothesized in the proposed questionnaire that such an environment is dependent on stakeholders having a shared vision and leaders communicating a vision;

Table 1. Questions, consistency, and reliability of the seven domains

**Innovation/environment** (Cronbach’s alpha = 0.83, test-retest = 0.96)
1. Experimenting with innovative ideas will get me nowhere in this school.*
2. This school will undertake something innovative only when it is clear that it will be successful.*
3. If I make a mistake at work, it will be held against me.*
4. In this school, it is important to do things right without ever making mistakes.*
5. By and large, the way we do things in this school will remain unchanged in the next 5 years.*

**Innovation/leadership** (Cronbach’s alpha = 0.69, test-retest = 0.82)
1. Leaders (deans, chairs, division heads) of this school favorably recognize those who try innovative things, even if they fail.
2. The leaders of this school emphasize the importance of being on the cutting edge of innovation.
3. The leaders of this school tend to uphold well-tested, traditional ways of doing things.*

**Innovation/personal** (Cronbach’s alpha = 0.63, test-retest = 0.86)
1. When it comes to the work I do, there is usually one best way to achieve a particular outcome.*
2. Projects with uncertain potential for success should be avoided at all costs.*
3. I try to reduce unpredictability and uncertainty in my work as much as possible.*
4. Errors and mistakes are signs of failure.*
5. I try innovative techniques in my work, even if I don’t know whether they will work or not.
6. It is dangerous to experiment with innovations that are not “tried-and-true.”*

**Feedback/environment** (Cronbach’s alpha = 0.64, test-retest = 0.91)
1. People in this school tend to react negatively to criticisms about their work.*
2. People I work with are comfortable questioning me about decisions I have made.
3. When I ask other faculty what they think about my work and me, I will get an honest answer.
4. In this school, it is OK to try something new without fear of negative repercussions.

**Feedback/personal** (Cronbach’s alpha = 0.62, test-retest = 0.84)
1. Criticisms from other faculty about my work usually do more personal harm than good.*
2. I have changed the way I do things as a result of feedback I received from other faculty.
3. I go out of my way to ask other faculty for feedback about my work.
4. I feel comfortable asking other faculty for help when I need it.

**Feedback/interpersonal** (Cronbach’s alpha = 0.60, test-retest = 0.85)
1. If I come across an innovative idea, I can influence other faculty to see my point of view.
2. Disagreements with colleagues at work should be avoided as much as possible.*
3. I am encouraged to be critical of ideas, even if they come from leaders of this school.
4. A good colleague is one who is always supportive of me and my decisions.*
5. When giving criticism or negative feedback, it is important to couch it as much as possible.*
6. It is not worth the trouble to question or raise objections to others’ opinions.*
7. At work, I actively provide alternative points of views to others’ expressed opinions.

**Evidence-based learning** (Cronbach’s alpha = 0.61, test-retest = 0.65)
1. Accept the recommendation and modify my teaching/treatment immediately.
2. Consider alternative explanations for why the treatment should continue to be provided.*
3. Refrain from changing my teaching/treatment until I hear the reactions of other faculty to the review.*
4. Reject the review because my personal clinical experience should supersede any information written in a literature review.*

*All statements not identified with an asterisk had a continuous scale ranging between −3 and +3 where “−3” refers to a very low score and “+3” a very high score. Statements marked with an asterisk had a reverse scale which was converted during analysis to match the other statements. Test-retest correlations were corrected using the Spearman-Brown formula.

**The stem for these questions is: “Imagine you read a comprehensive review of all studies evaluating one dental treatment. The review found that the treatment that you teach or practice is ineffective in improving the health status of your patients. How likely will you be to take the following course of action?”**
on stakeholders who see themselves as the major innovators and change agents; and on individuals and the organization accepting and seeking feedback on all activities.

The objective of this paper is to present the internal consistency and test-retest reliability of the domains of a questionnaire designed to assess innovation status in schools of dentistry. The findings from this preliminary study will be used to design a national survey of dental educators to evaluate the organizational environments within dental schools in the United States and identify strategies for encouraging innovation.

Methods

Development and Testing

Seventy questions were included in the first draft of the questionnaire. Items generated for the pretest were meant to capture individual differences in seven domains of organization learning and innovation. The respondents were asked to rate their level of agreement or disagreement with each statement, using a scale that ranged between “-3,” strongly disagree, and “+3,” strongly agree. The neutral position was identified as equivalent to “0.”

The first draft was pre-tested using personal one-on-one interviews with four senior administrators and faculty members from the schools of dentistry and medicine at the University of Michigan. All interviews were audiorecorded. Qualitative analysis of responses and comments was used to prepare a second draft of the questionnaire that included only thirty-three statements and additional demographic and background questions (Table 1).

Survey of Dental Faculty

Sample Selection

Two schools of dentistry were selected for participation in this phase. The first has about 300 dental students and several graduate/postgraduate programs. This school (referred to as CL school) is known for its focus on clinical education. The second also has about 300 dental students and several graduate/postgraduate programs. This school (referred to as RES school) is one of the top ten NIH-funded schools in the United States. Both dental schools had permanent deans at the time of the survey, and we have no indication that they were experiencing any significant turmoil.

For the CL school, all thirty-nine full-time faculty members (excluding deans) were invited to participate; a total of twenty-seven accepted and answered the questionnaire (a response rate of 69.2 percent). In the RES school, over half of the 100 full-time faculty members were selected in order to reduce cost of mailing and printing. The names of faculty members (excluding deans) were ordered alphabetically by their department affiliation, a random start was selected (in this case 2), and a systematic sample was selected (all faculty with an even number on the list). Of the fifty-six full-time faculty members selected, forty answered the questionnaire (a response rate of 71.4 percent). Thus, the total sample size in this study was ninety-five (CL=39, RES=56); out of those, sixty-seven (CL=27, RES=40) responded (a 70.5 percent response rate).

Instrument. The final draft of the questionnaire included thirty-three statements and additional demographic and background questions. For the evidence-based learning domain, the respondents were asked to indicate their level of agreement or disagreement with statements reflecting different decisions related to a scenario where it was found in a systematic review that “a treatment that you teach or practice is ineffective in improving the health status of your patients.” To reflect the bi-directional nature of the strongly disagree to strongly agree scale, the numeric scale assigned to the answers included both negative values for strong disagreement (-3) and positive values for strong agreement (+3), as well as points between “–3” and “+3.” The neutral position was identified as equivalent to “0.” The use of negative and positive numeric values in a rating scale more clearly indicates to respondents that the scale is bi-directional, in comparison to numeric scales that offer only positive values.21

The majority of the questions listed in Table 1 were presented to the respondents with a reversed scale (the “strongly disagree” score represented the correct answer based upon the characteristics of a learning organization model used to design the questionnaire). To average the answers from all the questions in a domain (Table 1), the scores of the reversed question were adjusted to reflect the same direction of the non-reversed questions (-3 became +3 and vice versa).

Demographic and professional variables. The questionnaire included questions on age and
gender of respondents, educational status, specialty status, and percent of time spent on teaching, service, and research.

**Administration**

The final questionnaire was mailed with a cover letter and self-addressed stamped envelope to faculty members in the selected schools. After two weeks, a reminder card was sent to those who did not respond; this was followed by a second mailing of the questionnaire with a self-stamped envelope. A third mailing was sent two weeks after the second mailing. Within a month after the last mailing, a systematic sample of thirty-five individuals was selected, and thirty of them answered the questionnaire a second time.

**Analyses**

Data were entered into a Microsoft Excel 7.0 spreadsheet and checked for accuracy. Analysis of the data was carried out using SAS. Scores for each domain were calculated by averaging the values for the questions included in the domain. Internal consistency of the seven previously described and conceptually derived domains measured in the questionnaire was tested using the Cronbach’s alpha coefficient of internal consistency. The impact of eliminating questions from each domain on the reliability of the domain was also evaluated.

Test-retest reliability was estimated using Pearson’s correlation coefficients. The Spearman-Brown formula was used to correct for the number of questions used in each of the domains. The average scores for each domain for both schools were compared using the Student’s t-test.

Finally, the association among the innovation/environment domain, the outcome domain, and the other domains, as well as the confounding variables represented by age, gender, percent of time spent doing research, and school indicator, was investigated using stepwise multiple linear regression models. Several models were developed for each set of variables, and the percentage contribution of each variable to the total explained variance of the outcome variable was used to decide whether a variable is to be included or excluded from the model. Variables were included through stepwise selection of a p-value of ≤0.15 as the inclusion criterion. Categorical variables representing the school, gender, and self-labeling of a respondent as a “clinical faculty” did not significantly increase the explanatory power of the regression models. The variable indicating whether a respondent had a doctorate was dropped from the model because of its high correlation with the percent of research time.

We decided against conducting factor analysis in this study because we chose the domains to reflect areas where leaders of dental schools can develop specific programs and assess their impact. Moreover, the ratio of the number of questions (K) to the total sample size (N), or K/N ratio, is too small in this study for us to have confidence in any factor solution. The ratio in this study is approximately one item/two respondents. While the minimum ratio is not known, the general rule is that the ratio should range from 1/2 to 1/20. More importantly, some empirical tests have shown that loadings in a factor analysis are the most important issue. In analyses with four or more loadings above 0.60, then those factors will be reliable regardless of sample size. Components with ten or more loadings of 0.40 are reliable as long as the sample size is greater than 150. Other authors suggest that correlations (which factor analysis is based on) are too unreliable with small samples and suggest that sample sizes of 50 are very poor, 100 are poor, 200 are fair, 300 are good, 500 are very good, and 1,000 are excellent. Hence, we have decided against conducting factor analysis because, given the small sample size in this study, the solution is highly suspect and likely to be unreliable.

**Results**

Table 1 presents the estimates of internal consistency and test-retest reliability for the seven domains measured by the questionnaire. The average score for the statements listed in each domain in Table 1 was computed for each respondent. The five questions designed to assess the degree of innovation within the schools’ environment had high internal consistency (0.83) and test-retest reliability (0.96). The innovation/leadership domain had good internal (0.69) and high test-retest reliability (0.82). The test-retest reliability of all other domains, except the evidence-based learning domain, was higher than 0.80. The internal consistency for the other domains was as follows: feedback/environment domain = 0.64, feedback/personal = 0.62, feedback/interper-
sonal = 0.6, innovation/personal = 0.63, and evidence-based learning = 0.61. Elimination of questions from each domain did not result in any significant change in the alpha coefficients.

Table 2 presents the correlation coefficients among the seven domains. The innovation/environment domain was highly correlated (P < 0.001) with the innovation/leadership (r = 0.69), feedback/environment (r = 0.62), and feedback/interpersonal (r = 0.54) domains. The innovation/environment domain was weakly correlated with the innovation/personal (r = 0.29) and feedback/personal domains (r = 0.34) (P <0.05), and the correlation with the evidence-based learning domain was negative and not different from “0” (r = -0.08). There were other significant correlations among the innovation/personal and feedback/environment domains with the feedback/personal and feedback/interpersonal domains.

Table 3 presents the average scores for each of the seven domains for the two schools (CL and RES). The average scores for innovation/leadership, innovation/environment, feedback/environment, and feedback/personal were significantly higher in the RES than in the CL dental school.

Stepwise multiple linear regression models were developed to assess the association between the innovation/environment and other domains, after accounting for other confounding factors such as age, gender, school (CL vs. RES), percent time devoted to research, and having a doctorate degree (Ph.D. or equivalent) (Table 4). The innovative/environment domain was used in this analysis as the outcome variable because it is considered a major goal in all attempted reforms of dental education and other organizations. The positive determinants of rating a school’s environment as encouraging innovation were innovation/leadership, feedback/environment, and feedback/interpersonal. Age and the evidence-based learning domain were negatively associated with the innovation/environment domain. This analysis did not identify the school identifier (CL vs. RES), gender,

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<tr>
<th>Table 2. Pearson's Correlation coefficients among the domains</th>
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<td>Domain</td>
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<td>--------------------------------</td>
</tr>
<tr>
<td>Innovation/environment</td>
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<tr>
<td>Innovation/leadership</td>
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<tr>
<td>Innovation/personal</td>
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<tr>
<td>Feedback/environment</td>
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<td>Feedback/personal</td>
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<tr>
<td>Feedback/interpersonal</td>
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<tr>
<td>Evidence-based learning</td>
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</table>

* Denotes significant correlations at the p<0.05 level
** Denotes significant correlations at the p<0.01 level

<table>
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<tr>
<th>Table 3. Means (standard deviations) of each scale by school of dentistry</th>
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<tr>
<td>Variable</td>
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<td>----------------------------</td>
</tr>
<tr>
<td>Innovation/environment</td>
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<td>Innovation/leadership</td>
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<td>Evidence-based learning</td>
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RES = research-intensive school; CL = focuses on clinical teaching

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<th>Table 4. Determinants of environmental innovation scores as perceived by responding faculty from two schools of dentistry in the United States—findings from stepwise multiple linear regression models**</th>
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<tr>
<td>Factor*</td>
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<tr>
<td>Innovation/leadership</td>
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<td>Innovation/personal</td>
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<td>Feedback/environment</td>
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<td>Feedback/interpersonal</td>
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<td>Evidence-based learning</td>
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<tr>
<td>Age</td>
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<tr>
<td>Percent time in research 40% or higher</td>
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<td>Less than 40% (reference)</td>
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R-squared = 0.69

* Categorical variables representing the school, gender, and self-labeling of a respondent as a “clinical faculty” did not significantly increase the explanatory power of the regression models. The variable indicating whether a respondent had a doctorate was dropped from the model because of its high correlation with the percent of research time.

** Variables were included through stepwise selection using criterion of p-value ≤ 0.15.
The feedback/personal and innovation/personal domains, or percentage of time allocated to research to be significant determinants of the perception that a dental school environment is innovative. The factors included in the regression model explained 69 percent of the variance in the innovation/environment domain.

When the regression analysis was repeated for each school separately, the innovation/leadership and feedback/environment domains were significantly associated with the innovation/environment domains in both schools (data are available upon request). The percent of explained variation in the innovation/environment domain was 0.69 in the RES school model and 0.90 in the CL school model.

Discussion

The aim of the preliminary study reported in this paper was to evaluate the internal consistency and test-retest reliability of a new questionnaire that was designed to measure organizational and personal factors associated with innovation and change in schools of dentistry. The survey of dental faculty from two geographically and functionally different schools yielded a good response rate of about 70 percent. The reason for this high response may be related to the design of the questionnaire, the topic, or the method used to mail and seek response from the targeted population. The strong explanatory power of the regression model and the magnitude of the difference on some of the domains between the two schools (data are available upon request) provide for the first data on innovation status and some of its determinants in two schools of dentistry in the United States.

The data presented in this paper show that the conceptually derived domains do measure factors associated with respondents’ rating of their schools’ level of innovation. The innovation/environment domain had a very high internal consistency and test-retest reliability. In this small survey, the RES school achieved an average score of 0.96 and the CL school had an average score of 0.16 (an average score of “0” would indicate a school judged to have an environment that was neutral toward innovation). We can surmise from these scores that the RES school faculty felt their school environment is more supportive of innovation and risk-taking than the CL school environment. However, both of these scores indicate a need for improvement in the environments of both schools.

All the other domains, except for evidence-based learning, achieved high test-retest reliability. The domain of innovation/environment had excellent internal consistency (alpha = 0.83). The internal consistency coefficients for the other domains were higher than 0.60, indicating a fair degree of internal consistency. However, the alpha coefficients were lower than the desired 0.70.26 Given the strength of the test-retest reliability for six of the seven domains and the percent of explained variation in the regression model (Table 4), we conclude that these domains have both acceptable internal consistency and test-retest reliability to measure determinants of innovation and change in schools of dentistry. The selected domains represent different areas for intervention that leaders (deans, chairs, division heads) can focus on to develop an innovative environment.

This preliminary study found significant differences in the bivariate comparisons (Table 3) between the CL and RES schools in the perception of the responding faculty on innovation/environment, innovation/leadership, feedback/environment, and feedback/personal. The scores for both schools were relatively low (close to the neutral zone on the scale used in this study). This finding indicates significant room for improvement in both schools to develop stronger innovative environments.

The characteristics measured by the significant domains in Table 4 are proxy measures for the strength of “intellectual capital” in organizations.27,28 All organizations, including schools of dentistry, have workforces that operate using physical, emotional, behavioral, personal, and intellectual cues. To innovate and change, organizations need to develop workforces that accept and demand innovation and change to improve on the status quo. Schools of dentistry should become learning laboratories where information is exchanged freely without fear, critical feedback is provided and sought, experiences and failures are analyzed, and adaptation and change are performed for the good of the organization. Schools of dentistry in the twenty-first century should develop environments where new ideas are welcomed and rewarded without fear of failure, innovation and change are expected and welcomed, and faculty develop flexibility and openness to experiment with new ideas. To achieve these goals, the model presented in this paper suggests that leaders should “communi-
cate, communicate, and communicate” a vision promoting innovation and change, as well as promote environments where teams of faculty as well as individual faculty seek, welcome, provide, and accept feedback and criticism. Leaders of dental schools should create an environment and programs to promote flexibility in creative and analytical thinking and behaviors among all faculty, staff, and students. It is not uncommon in schools of dentistry to hear it is not worth the trouble to question or raise objections to others’ opinions” and “a good colleague always supportive of me and my decisions.” These beliefs and behaviors are counterproductive to development of viable and dynamic organizations.14

The findings of this small study point to the importance of working in an environment that encourages feedback. Feedback is closely tied to developing a workforce that can accept and seek criticism and constant evaluation of performance. A recent study conducted on teams of health providers at a large hospital found that successful teams are those led by managers who have created an environment where mistakes are debated and corrected without the fear of criticism or punishment.14

In this small-scale study, the feedback/personal domain was not statistically associated with the respondents’ rating of the innovation/environment domain. This finding may indicate that faculty members who are high seekers of feedback felt that the environment they work in was not highly innovative or that respondents did not feel comfortable about feedback or criticism of their own work. Similarly, we found that respondents who scored high on the evidence-based learning domain rated significantly lower the environment/innovation domain than respondents who scored lower on the evidence-based learning domain. This finding may indicate that respondents who are willing to change their teaching based upon current scientific evidence do not consider the overall environment of their school to be innovative.

In conclusion, this preliminary study found that a thirty-three-item questionnaire designed to measure different dimensions of innovation and feedback has fair to very good internal consistency and high test-retest reliability. This study found that an innovative environment in schools of dentistry is associated with the presence of leaders who promote change and innovation, an environment that encourages feedback, and faculty members who value interpersonal feedback.

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