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Analysis of the relationship between program design and professional practice in CMCC's undergraduate chiropractic program

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This study examines the linkage between education and professional practice. Using a consumer-based retrospective survey, alumni from the 1993 to the 1998 CMCC graduating classes were asked to evaluate how well they believed that their undergraduate program had prepared them for professional practice. Alumni responses were collected under the overall category of preparation for practice, *and also under the more specific categories of* appropriateness of course content, appropriateness of time allocation, *and* 'unnecessary' repetition of content. *Findings from this study showed that, overall, the CMCC undergraduate chiropractic program prepared its students well for professional practice and, where more specific program concerns were identified, modifications may be called for across a multitude of data variables. This study shows that a retrospective analysis based on the experiences and reflections of the CMCC alumni of their program presents a reliable and valid method for curriculum review. The data collected support the assumption that a linkage exists between undergraduate education and professional practice.*
(JCCA 2000; 44(4):230–244)

KEY WORDS: professional, alumni, program, curriculum, content, time, repetition, continuous improvement.

La présente étude vise à analyser le lien entre la formation et la pratique professionnelle. Dans une enquête rétrospective fondée sur les consommateurs, on a demandé aux diplômés du CMCC des cohortes de 1993 à 1998 d'évaluer la qualité du programme de premier cycle du point de vue de la préparation à la pratique professionnelle. Les réponses ont d'abord été classées dans la catégorie générale de la préparation à la pratique, puis dans des catégories plus précises, soit la pertinence du contenu des cours, l'attribution du temps et les répétitions « inutiles » de contenu. Dans l'ensemble, les résultats de l'enquête montrent que le programme de premier cycle du CMCC prépare adéquatement les étudiants à la pratique professionnelle; quant aux points laissant à désirer, des modifications pourraient être apportées à une foule de variables. L'étude montre qu'une analyse rétrospective reposant sur l'expérience et les réflexions des diplômés du CMCC constitue une méthode fiable et valable de révision du programme. La collecte de données étaye l'allégation selon laquelle il existe un lien entre la formation au premier cycle et la pratique professionnelle.
(JACC 2000; 44(4):230–244)

MOTS CLÉS : professionnel, diplômé, programme, programme d'études, contenu, temps, répétitions, amélioration continue.

Introduction

Researchers such as Friedson, Doyle, Cruess & Cruess[1–3] describe a profession as an occupational group that claims not only to have expertise in a particular sphere of practice, but which benefits also from the legitimacy provided through public acceptance of what the occupation asserts about itself. These researchers have shown that, amongst other concerns, professions are responsible for the training they provide to the students they admit, and that their graduates will be properly prepared to gain their livelihoods by providing service to the public in the area of their

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expertise.[4] Thus, one might reasonably infer that professions are characterized by the nature of preparation they provide to their members.

Accordingly, this enquiry probes the foundation of this preparation for practice at the Canadian Memorial Chiropractic College (CMCC) by asking the alumni to report on the degree to which they have been prepared to practice as professionals. Other researchers[5–8] have commented on the positive relationship they believe needs to exist between chiropractic education, patient care, and professional credibility. Nevertheless, there remains a dearth of knowledge and research on the relationship between chiropractic education and professional practice.

In turn, this study is designed to extend the research and knowledge base concerning the relationship between chiropractic education and professional practice. It is an evaluation that is consumer-based,[9,10] and is grounded in a number of concerns fundamental to the undergraduate educational program. In addition to the 'preparation for practice' variable, the authors believed it important to ask *How can the needs of the alumni be utilized to influence changes in their professional program?* This study also relates to another question that underlies professional education more generally: *How can professionals help develop the professional education program which helped prepare them for practice?* Accordingly, the main and supporting questions investigated in this study are:

How well does the undergraduate chiropractic program prepare the students for professional practice?

- **i** How appropriate was the program's course content in preparing the students for professional practice?
- **ii** How appropriately was instructional time allocated in the chiropractic program?
- **iii** How much "unnecessary" repetition of course content exists in the program?

CMCC has a group of curriculum competencies that serve as a basis for fulfilling its goal of "providing an educational program that helps develop competent doctors of chiropractic". The *CMCC Alumni Curriculum Development Survey* is designed to gather data from those who not only have been the recipients of the undergraduate chiropractic program and who have applied it in professional practice, but who also have had the opportunity to reflect on how well the program has prepared them as professional practitioners.

In this inquiry it is assumed that there is a direct and meaningful relationship between the academic and clinical experiences students receive in their undergraduate chiropractic program and how well these experiences prepare them for professional practice. Second, the variables of content, time and "unnecessary" repetition in the program individually, and in combination, are assumed to prepare our graduates for professional practice. It is also assumed that knowledge which is competency-based, integrated, and relevant to chiropractic practice has a positive influence in preparing the students for professional practice; that time dedicated to components of the curriculum that are characterized by effective and diverse instructional delivery, and is on-task contributes to classroom learning; and that some repetition in the knowledge delivered might be acceptable because of a need to help reinforce concepts, skills, and/or attitudes, and because of their core importance to practice. However, we also assume that in contrast to "necessary" repetition, there may be "unnecessary" repetition in knowledge delivered, and that this "unnecessary" repetition may have an unfavorable impact on preparing the students for professional practice.

Preparation for Practice refers to how well each course/skill category in the curriculum contributed to a student's overall preparation for practice. ***Course Content*** refers to knowledge and skill categories which were deemed suitable in preparing students for practice. ***Time*** refers to the time allocated in the timetable for the delivery of each course/skill category in order to prepare students for practice. ***Unnecessary Content Repetition*** refers to the delivery of knowledge, attitudes and skills that are repeated either within or between courses, but which do not have a positive effect on preparation for practice. ***Program*** refers to the entire combination of academic and clinical experiences students receive at CMCC as a prelude to beginning professional practice while ***curriculum*** refers more specifically to separate components of the chiropractic curriculum. ***Course and Skill Categories*** refers to the eighteen course and the seventeen skill categories pertinent to, and specified in the program tables presented. ***Division*** refers to the faculty of Undergraduate Studies while ***Department*** refers to the administrative groupings (e.g., Biological Sciences, Clinical Education) within the faculty.

Table 1 Yearly Distribution of Sample Responses

1993	1994	1995	1996	1997
18% (*N* = 58)	21% (*N* = 67)	21% (*N* = 68)	22% (*N* = 71)	19% (*N* = 61)

Table 2 Respondent Practice Experience by Number of Years

1 Year	2 Years	3 Years	4 Years	5 Years
17.6% (*N* = 58)	24% (*N* = 76)	20% (*N* = 65)	22% (*N* = 72)	17% (*N* = 54)

The context

The Canadian Memorial Chiropractic College is a privately owned institution chartered under the Corporations Act of Ontario. The program admits students who, minimally, have acquired at least three full years of undergraduate university study, an appropriate grade point average, verbal and written facility with the English language, and a standard of character suitable to the chiropractic profession. The current program lasts for four years, i.e., for 36 months, which includes academic as well as clinical training in the College's Out Patient Clinic as part of the Clinic internship requirements.

The CMCC undergraduate program is the combination of cognitive, affective and psychomotor domains of areas of knowledge, attitudes, and skills that help to make up its chiropractic competencies. The CMCC Competency Document,[11] completed in 1997 outlines foundational knowledge, diagnostic, treatment, and management competencies critical to patient care. Students experience the program through lecture, tutorial, clinical rounds, self-directed instructional, and clinical internship formats. Four administrative departments (i.e., Biological Sciences, Chiropractic Sciences, Clinical Sciences, and Clinical Education) are included in the management of the overall undergraduate program. The main goal of the undergraduate program is to prepare students to apply what they learn in their program to professional practice. The knowledge and skill categories in the CMCC chiropractic program are intertwined in order to help fulfill this goal.

The sample

The data from this inquiry come from CMCC alumni who have completed all of their program requirements. Responses were received from 325 alumni (52% rate of return) who graduated from CMCC between the 1993/94 and 1997/98 school years. Table 1 illustrates the distribution of responses of the sample according to year of graduation.

The number of respondents by year varies from a low of 58 (18%) to a high of 71 (22%). As a result, responses shown in Table 2 were fairly evenly divided according to experience in practice.

From Table 2 it can be seen that the numbers of respondents according to experience in practice vary from a low of 54 (with five years) to a high of 76 (with two years). However, in percentage terms, the range of variance is from 17% to 24% for these years. Table 3 identifies the area of respondents' residences.

It can be seen that most of the respondents reside in Ontario (57%) and in British Columbia (13%). All of the other respondents make up the remainder (30%) of the sample.

Study design, data, and data collection

The descriptive survey used in this study has a five-point Likert Scale. The survey was separated into two formats for the purpose of accuracy in data collection. A five-point sliding scale was used in collecting data about the categories of *Amount of Time in the Curriculum* and *Content Repetition*, where 1 = too little, and 5 = too much. For the categories of *Preparation for Practice* and *Content of Courses*, a scale where 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent was used. The results from these two groups of categories need to be interpreted

Table 3 Respondent Residence by Geographic Area

British Columbia	13% (*N* = 41)	Nova Scotia	3.2 (*N* = 10)
Alberta	6.1% (*N* = 20)	New Brunswick	1.9% (*N* = 6)
Saskatchewan	3.6% (*N* = 12)	Prince Edward Island	.3% (*N* = 1)
Manitoba	1.3% (*N* = 4)	Newfoundland	1.6% (*N* = 5)
Ontario	57% (*N* = 186)	United States	1.35 (*N* = 4)
Quebec	2.6% (*N* = 8)	Europe	1.3% (*N* = 4)

in terms of their own contexts (e.g., a '5' denoting 'too much' time in Physiology is not comparable to a '5' denoting 'excellent' in Preparation for Practice for Physiology). This survey provided the respondents with opportunities to respond to open-ended statements.

Although both advantages and disadvantages are associated with this research design,[12] the advantages are seen to outweigh the disadvantages. This survey design permitted wide coverage of our population at minimum expense in terms of money and time. It afforded an international scope, and reached people who would otherwise have been difficult to interview. The wide coverage of our sample contributed to a greater validity and reliability through a larger and more representative sample. The detailed textual survey permitted the authors to receive data on more considered responses. The same textual format provided our sample with greater uniformity in the manner in which the questions were posed. Not only did it lessen the interviewer effect, but it also gave our respondents a sense of privacy. Finally, it set up a simple means of continual reporting over time. However, the problem of non-returns must be addressed since those who answered the survey may differ significantly from the non-respondents, thereby biasing the sample. However, a response of 325 returns out of a possible 620 (52%) helps to ensure that the data collected is statistically reliable.

The survey was designed in May and June of 1998. It was critiqued by twelve CMCC faculty members, and was then pilot-tested with twelve resident students, and faculty. Feedback from these trials was incorporated into the refinement of the survey. It was then mailed out in the third week of September, 1998 to 620 alumni. Responses were received from 325 (52%) of these alumni by December of 1998. The results were inputted on SPSS (Version 9.0), and Corel WordPerfect (Version 9) for data organization, statistical analyses, and graphic presentation.

Presentation of data

The data in this study is displayed through tables containing lower and upper confidence intervals of course and skill areas. All means are presented in relation to the five point Likert Scale of the survey. The confidence interval (CI) takes into account the variance around the mean for each score collected. Therefore, the estimation approach to our analyses with the CI presents degrees of certainty as well as of uncertainty regarding the strength of the variables.[13] It offers more information for making inferences about the entire alumni and chiropractic population. Together, the lower and upper limits that define the range of the CI are the 'confidence limits' of that CI. The CIs in the tables in this study are at the 95% level of confidence, i.e., we can be 95% confident that the true population value lies within our confidence limits. (In turn, a 'significant' *p*-value of $p < .05$ will correspond to a 95% CI). Because the CIs elaborate (rather than merely indicate) the significance or insignificance of a variable, the strength of evidence[14] about courses and skills offer more robust data for the continual improvement of CMCC's undergraduate chiropractic program.

Finally, the entire range of course and skill categories is presented for all four administrative departments within CMCC. As a result, data may be compared within and between administrative departments.

Significance of the study

Two strategies[4] have been undertaken by professional schools to ameliorate tension between organizing theoretical and practical knowledge. The first of these is to codify knowledge, and to give students as much understanding as possible about every conceivable situation they might ever encounter. The alternative strategy is to give students the kind of reasoning skills and strategies that will allow them to adapt to a wide variety of situations they are likely to encounter as licensed practitioners. As documented by the American Association of Medical Colleges (AAMC),[15] the trend to balancing the theoretical with the practical in health science programs is now commonplace. However, balancing the theoretical and the practical is not necessarily synonymous with integrating knowledge in these programs. But since the design of this study assumes a positive and direct relationship between education and professional practice, this study offers rich potential for integrating as well as balancing the theoretical with the practical.

CMCC is in the midst of a Curriculum Transformation Project (CTP) with the objectives of integrating knowledge, and of relating education to professional practice. As a result, the data from this survey might be applied to the CMCC context. Cronbach[16] argued that, for a maximum benefit, evaluation needs to focus on the ways in which refinements and improvements could occur while a program was in the process of development. Other research[17,18] clarifies how it is *within* the design of the curriculum that we need to acknowledge intentions for educational change. The findings strongly suggest that educational and conceptual change is not simply a technical problem, but intricately a cultural problem that requires incorporation of the contexts and shared meanings of the participants involved in the design during the program planning process.

Evaluation has as many purposes as people have interests.[19] There is a growing need for evaluation in order to focus not only on program improvement, but also on *continuous* program improvement! The data gathered from this survey can help to evaluate "whether or not the delivery of services is reaching the appropriate target population and whether or not the delivery of services is consistent with program design specifications".[20] As a consequence, the data collected might be used for accountability purposes in the present, and also might be considered useful for monitoring ongoing delivery with a view to program improvement in the future. Unless programs have a demonstrable impact, it is hard to defend their implementation and continuation.

Perhaps contributing most to professional cohesiveness is the alumni empowerment issue. Interests aimed at 'solidifying' any profession, helping it evolve into a 'community', and increasing this community's participation in educational affairs is a growing priority for educational institutions across North America. The CMCC alumni who have been asked to voice their experiences with the program are also given the opportunity to improve it.

Limitations

This study was limited to the last five years (1993/94 to the 1997/98 school year) of CMCC graduates. In turn, the clarity, scope and depth of data received from the alumni were influenced by the time elapsed since their graduation. In addition, there existed changes made to parts of the program throughout this five-year period. As a result, the perceptions of the program may not be standardized amongst alumni surveyed across this period of time. However, changes made to the overall program were not considered to alter significantly the clarity, scope and depth of the data collected. Nevertheless, research[21,22] establishes that conceptual and behavioral change based on program reform occurs slowly.

As well, the responses given from alumni may vary according to the specific relationships they had with their professors in specific years of study. That is, there may exist data bias from not separating the issue of personal relationship with their instructors and that of the course material in preparing them for professional practice.

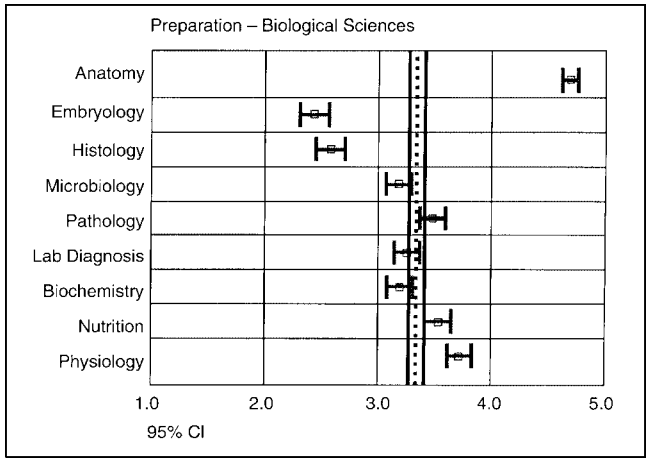
Not all alumni responded to our survey. As a result, the data collected provided the researchers with a "snapshot" of how the program prepared its graduates for professional practice. Nevertheless, although the response was 52% of those polled, and limited to the last five years of graduation, the survey was concisely and clearly focused in the explanation of its purpose. As well, the responses were balanced across the 1993/4 to the 1997/98 school years. However, because of reliance on their recall of past events, caution is needed in interpreting our samples' data as positive, neutral or negative.

Results

1. Preparation for practice

Table 4 shows how the CMCC alumni reported how the course categories within the Biological Sciences prepared them for professional practice. The overall mean for this group is 3.34 ('good'). As well, the lower and upper confidence intervals for this group are 3.27 and 3.41 respectively. The standard deviation for this group is .6089.

Table 4
Preparation – Biological Sciences



Of the nine course categories in the Biological Sciences, three deviate significantly from the overall confidence interval for this group. Embryology and Histology both fall well outside the lower limit of the group confidence interval, and are both in the 'fair' category. Anatomy falls well above the upper confidence interval for the entire group. The remaining six course categories fall within the group and are all rated as 'good' in relation to preparation for practice.

Table 5 lists the four general Chiropractic Sciences course categories and their ratings in terms of preparation for practice. The overall alumni mean for this group is 3.2 ('good'). The lower and upper confidence intervals respectively for the entire group are 3.19 and 3.39 with a standard deviation of .8881.

The two categories of Chiropractic Principles (mean of 2.92), and Practice Management (mean of 2.54) fall below the group mean and are rated by our alumni as 'fair'. Another two – Jurisprudence (mean of 3.87), and Applied Chiropractic (mean of 3.84) fall above the group mean and are rated from 'good' to 'very good' in preparing students for professional practice.

Table 5
Preparation – Chiropractic Sciences

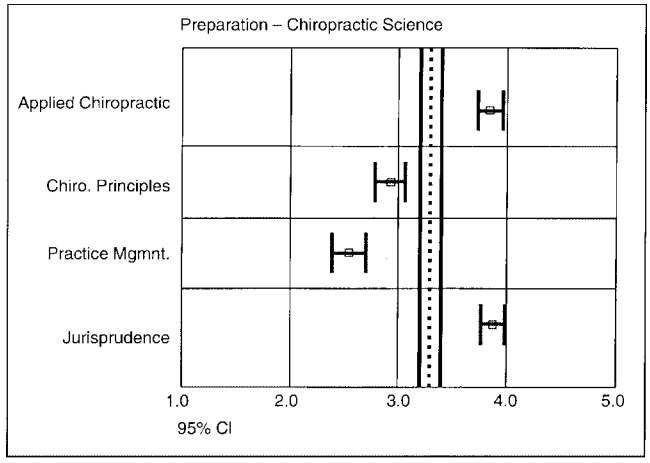
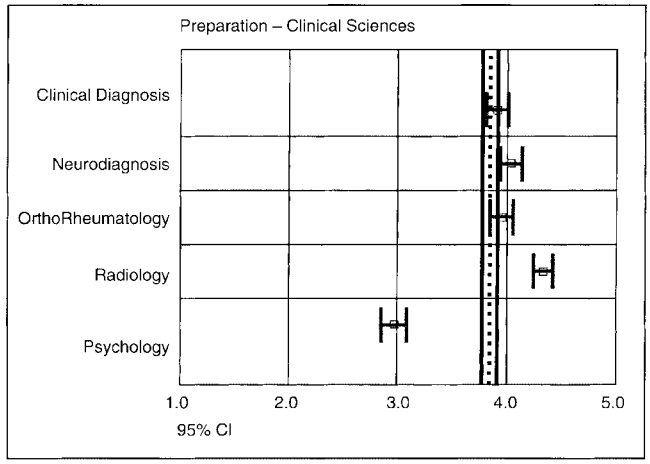


Table 6 identifies the results for the course categories in the Clinical Sciences. The overall alumni mean for this group is 3.84 ('good'). The lower and upper confidence interval limits for the group are 3.77 and 3.92 with a standard deviation of .6656.

Table 6
Preparation – Clinical Sciences

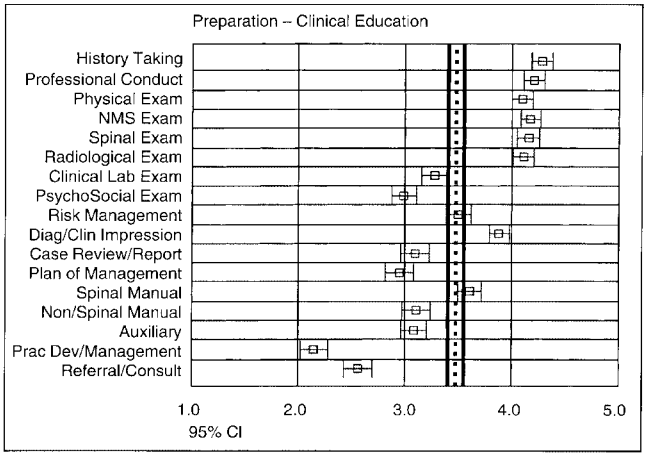


The confidence interval of Psychology (mean of 3.00)

falls outside that for the group though still falls within the 'good' range. The remaining four Clinical Science course categories are all rated highly: Clinical Diagnosis with a mean of 3.91 ('good' to 'very good'), Neurodiagnosis with a mean of 4.04 ('very good'), OrthoRheumatology with a mean of 3.95 ('good' to 'very good'), and Radiology with a mean of 4.32 ('very good').

Table 7 represents how the alumni have rated the skill categories in the Clinical Education Department. The alumni mean for this group is 3.48. While the standard deviation is .6840, the lower and upper confidence intervals for all scores in this group are 3.41 and 3.56 respectively.

Table 7
Preparation – Clinical Education



Three categories, Clinical Lab Exam, Risk Management, and Spinal Manual Therapy are located close to the group mean and confidence intervals. Another seven, History Taking, Professional Conduct, Physical Exam, Neuromusculoskeletal Exam, Spinal Exam, Radiological Exam, and Diagnosis and Clinical Impressions all fall above the upper confidence interval for the total group and were rated from 'good' to 'very good'. Alternatively, the Psycho-Social Exam, Case and Review Reporting, Plan of Management, Non Spinal Manual Therapy and Auxiliary Therapy fall below the group's lower confidence interval but still near to a mean of 3 ('good'). Another two, Practice Development and Management with a mean of 2.14, and Referral and Consultation with a mean of 2.55 are both rated as 'fair'.

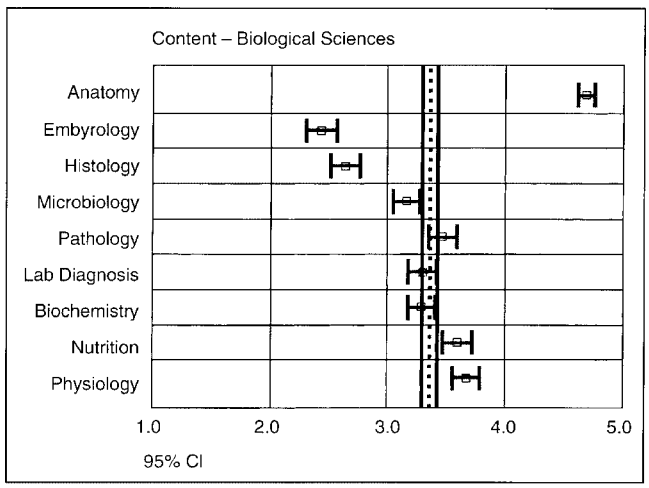
Summary – Preparation: Tables four to seven represent the combination of the *Preparation for Practice* variable across all CMCC departments. The overall alumni mean for the course and skill categories in Tables 4 to 7 that pertain to *Preparation for Practice* is 3.49 ('good'). The ratings have a standard deviation of .5772 while the lower and higher confidence intervals for this variable are 3.42 and 3.55.

Overall, five (14%) of the total course and skill categories (Embryology, Histology, Practice Management, Practice Development & Management, and Referral and Consultation) of the *Preparation for Practice* variable are below the lower confidence interval for the entire group. Alternatively, another eight (23%) are rated as 'very good' with Anatomy rating very close to 'excellent'. The remaining twenty-two (63%) of the course and skill categories are rated between 'good' and 'very good'.

2. Content

Table 8 identifies the level of appropriateness that the alumni attributed to the course content in the Biological Sciences. The alumni mean for this group is 3.36 ('good'). The lower and upper confidence intervals are 3.28 and 3.43 with a standard deviation of .6652.

Table 8
Content – Biological Sciences



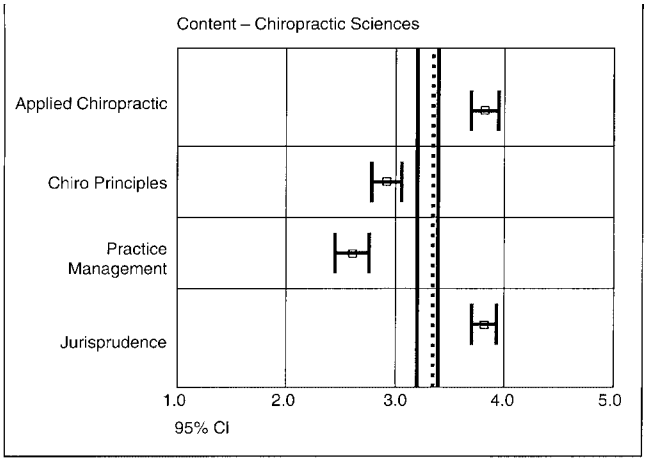
Of the nine course categories in this section, two (Embryology and Histology) with respective means of 2.43 and 2.63 are below the lower confidence interval for the group and are both rated as 'fair'. Anatomy with a mean of 4.68 is

ranked above the upper confidence interval for the group as 'very good' approaching 'excellent'. The remaining six course categories (Microbiology, Pathology, Lab Diagnosis, Biochemistry, Nutrition, and Physiology) are close to the alumni mean of 3.36, and have been rated as 'good'.

Table 9 concerns the appropriateness of content allotted to course categories in the Chiropractic Sciences department. The alumni mean for the group is 3.35 ('good'). The lower and upper confidence intervals are 3.19 and 3.40 respectively with a standard deviation of .9403.

In this group, Applied Chiropractic and Jurisprudence

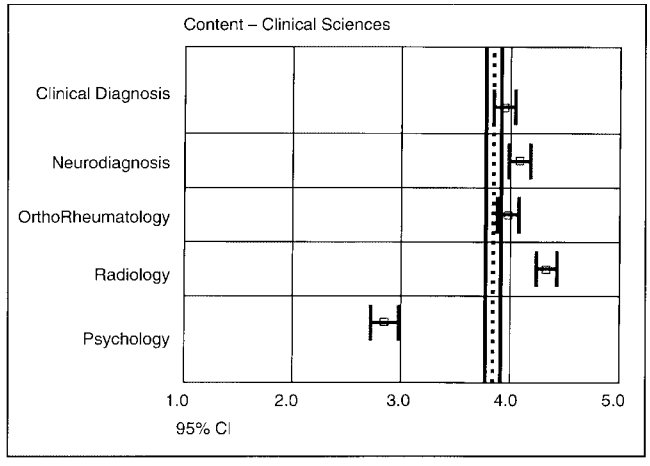
Table 9
Content – Chiropractic Sciences



(both with means of 3.83) were placed above the upper confidence interval for the group, and were both rated very close to 'very good'. The other two course categories (Chiropractic Principles with a mean of 2.92, and Practice Management with a mean of 2.60) were both rated as 'fair' by the alumni in terms of their content material. Nevertheless, the upper confidence interval for Chiropractic Principles falls within the range of 'good' for this department.

Table 10 portrays the results for how well the Clinical Science courses were rated in terms of appropriateness of content. The alumni mean for the group is 3.84 ('good'). The lower and upper confidence intervals are 3.76 and 3.92 respectively with a standard deviation for all scores of .6970.

Table 10
Content – Clinical Sciences

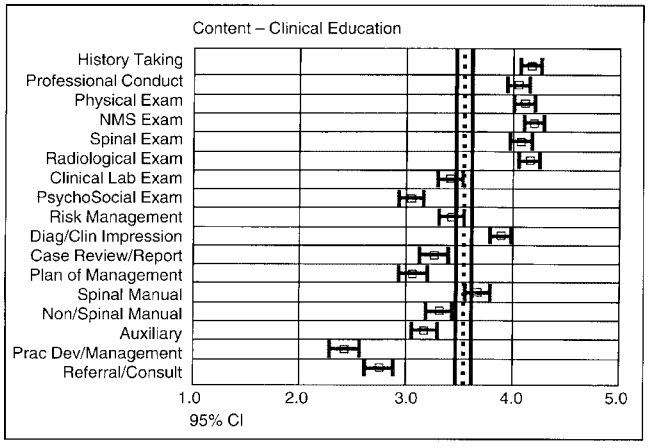


Neurodiagnosis and Radiology with means of 4.09 and 4.33 respectively (both 'very good') ranked above the upper confidence interval of 3.92 ('good' and near to 'very good') for this group. As well, Clinical Diagnosis and OrthoRheumatology with means of 3.94 and 3.98 respectively (both extremely close to 'very good') fall within the group's confidence intervals. Psychology with a mean of 2.85 ('fair') fell below the lower confidence interval of 3.76 for the group. The overall alumni mean of 3.84 for the composite of Clinical Science courses is extremely close to 'very good'.

Table 11 identifies the appropriateness of content in the Clinical Education department. The alumni mean for this section is 3.54 ('good'). The lower and upper confidence intervals are 3.46 and 3.62 respectively with a standard deviation of .7414.

Seven (41%) of the skill categories (History Taking, Professional Conduct, Physical Exam, Neuromusculoskeletal Exam, Spinal Exam, Radiological Exam, and Diagnosis & Clinical Impressions) are all rated just above 'very good'. Of the 17 skill categories in this group, six (35%) fall below the lower confidence interval of 3.46. These six skill categories are the Psycho-Social Exam, Case Review & Report, Plan of Management, Auxiliary Therapy, Practice Development & Management, and Referral & Consultation. The first four are rated as 'good' while the latter two are rated as 'fair'. Another four (24%)

Table 11
Content – Clinical Education



of the skill categories (Clinical Lab Exam, Risk Management, Spinal Manual Therapy, and Non Spinal Manual Therapy) were also rated as 'good', and are ranked more closely to the group mean of 3.54.

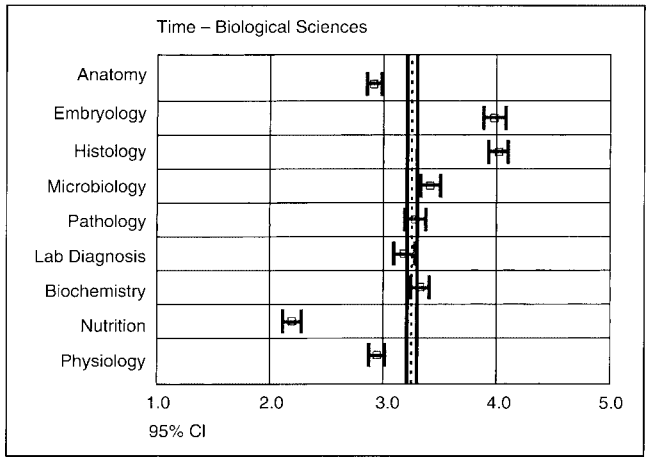
Summary – Content: Tables eight through eleven combine the scores from all of the undergraduate departments with regard to the appropriateness of content throughout the entire CMCC undergraduate program. The overall alumni mean for this group is 3.51 ('good'). The lower and upper confidence intervals are 3.44 and 3.58 respectively with an overall standard deviation of .6259.

The overall mean of 3.51 for content amongst all CMCC course and skill categories is at the midpoint between 'good' and 'very good'. Of the total thirty-five course and skill categories, 14 (40%) are ranked as either 'very good' or near to it. Anatomy has an overall mean of 4.68 ('very good' nearing 'excellent'). Another seven (20%) of the course and skill categories (Pathology, Nutrition, Physiology, Clinical Lab Exam, Risk Management, Spinal Manual Therapy, and Non Spinal Manual Therapy) are all rated as 'good'. As well, Microbiology, Lab Diagnosis, Biochemistry, Psycho-Social Exam, Case Review & Report, Plan of Management, and Auxiliary are rated as 'good' even though they fall below the lower group CI of 3.44. However, the last seven (20%) course and skill categories (Embryology, Histology, Chiropractic Principles, Practice Management, Psychology, Practice Development & Management, and Referral) are all rated as 'fair'.

3. Time

Table 12 identifies the appropriateness of time allotted to the course categories in the Biological Sciences. The overall mean for this variable for the Biological Sciences is 3.25 ('satisfactory'). The lower and upper confidence intervals are 3.21 and 3.30 respectively with a standard deviation of .3916.

Table 12
Time – Biological Sciences

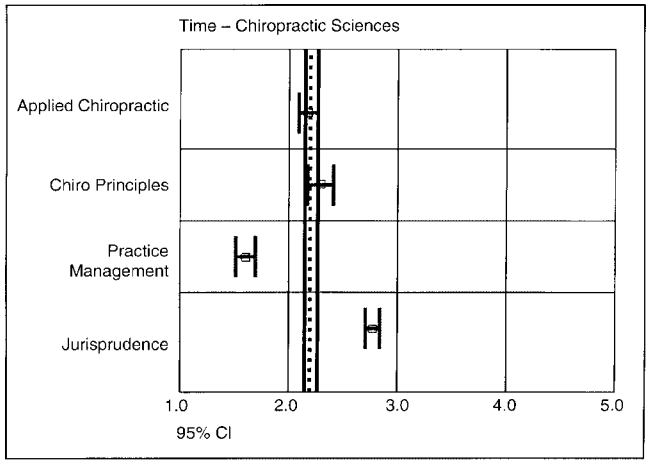


Nutrition is identified as having 'too little' time devoted to its delivery. Although Embryology and Histology are identified as having 'too much' time in this regard, (Microbiology, Pathology, Lab Diagnosis, and Biochemistry) are identified as 'satisfactory' in terms of the time apportioned to their deliveries. While Anatomy and Physiology are both below the lower confidence interval for acceptable limits of time apportioned, both are ranked by the alumni as 'satisfactory'.

Table 13 portrays the appropriateness of time devoted to the course categories in the Chiropractic Principles department by the alumni. The overall mean for this group is 2.2 ('too little'). The lower and upper confidence intervals are 2.15 and 2.27 respectively with a standard deviation of .5203.

All course categories in this department are identified as having 'too little' time allotted to them in terms of preparing the alumni for professional practice. In particular, Practice Management with a mean of 1.60 is the lowest rated while Jurisprudence with a mean of 2.78 is the high-

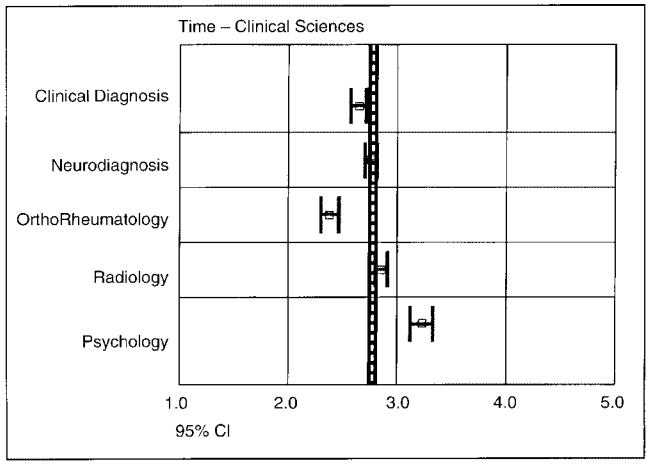
Table 13
Time – Chiropractic Sciences



est rated course category in this group. Finally, Applied Chiropractic and Chiropractic Principles with means of 2.17, and 2.29 respectively are also identified as needing more time allotted to them.

Table 14 portrays the appropriateness of time devoted to the course categories in the Clinical Science department. The mean for this group is 2.77 (slightly below 'satisfactory'). The lower and upper confidence intervals are 2.73 and 2.80 respectively with a standard deviation for the group of .675.

Table 14
Time – Clinical Sciences

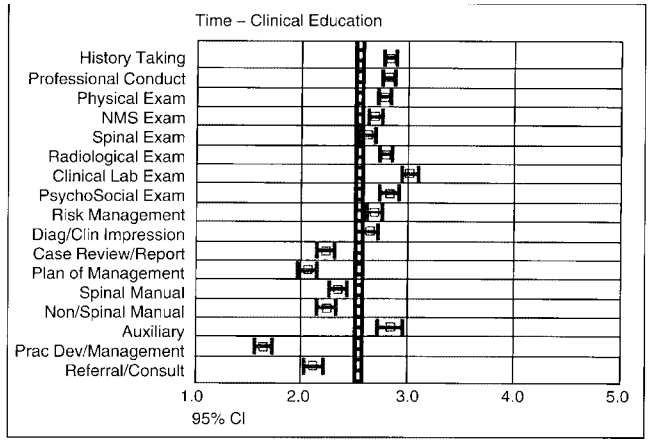


The confidence intervals for this group are both near to 'satisfactory'. As well, the course categories of Clinical Diagnosis, Neurodiagnosis, and Radiology are also ranked as near to 'satisfactory'. The two exceptions in this group are OrthoRheumatology with a mean of 2.37 (indicating somewhat 'too little' time) and Psychology with a mean of 3.23 (indicating somewhat 'too much' time) devoted to their deliveries.

Table 15 indicates the appropriateness of time devoted to the skill categories in the Clinical Education department. The overall mean for this group is 2.54 ('too little') while the lower and upper confidence intervals respectively are 2.50 and 2.58. The standard deviation for all scores within is .7010.

CMCC alumni have indicated that, except for the Clinical Exam category, all of the remaining skill categories need to have more time devoted to them in their delivery. The most serious concerns indicated here are that of Practice Development & Management, and Plan of Management with means respectively of 1.64 and 2.06 (both 'too little'). The position of the mean and confidence intervals for this department indicate that the CMCC alumni believe more time ought to be allotted to the delivery of the Clinical Education skill categories.

Table 15
Time – Clinical Education



Summary – Time: Tables twelve through fifteen provide an overview of all of the departments within the CMCC

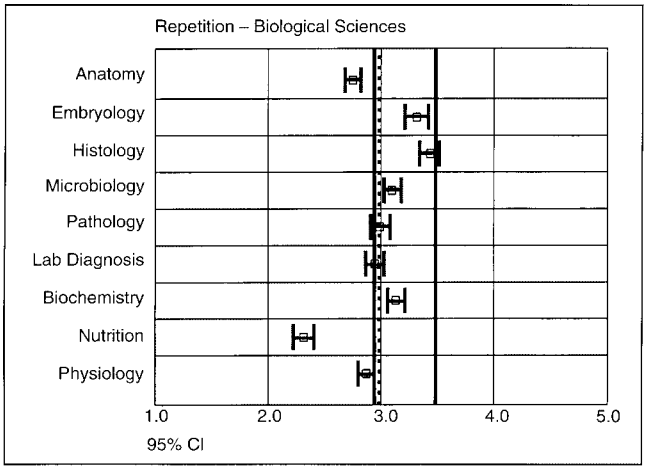
undergraduate program according to the appropriateness of time allotted to the course and skill categories. The overall mean for this variable is 2.72 (somewhat 'too little') with lower and upper confidence intervals of 2.68 and 2.76 respectively. The standard deviation for all scores in this group is .3546.

Nearly half of the total number of course and skill categories in the undergraduate program require at least some remediation. For example, Practice Management, and Practice Development & Management are identified as having 'too little' time in the program. Another nine, (Nutrition, Physiology, Chiropractic Principles, Ortho Rheumatology, Case Review & Report, Plan of Management, Spinal Manual Therapy, Non Spinal Manual Therapy, and Referral) fall somewhat below the mean for the undergraduate program. On the other hand, Embryology and Histology are identified as having 'too much' time allotted to them while Microbiology, Pathology, Lab Diagnosis, Biochemistry, and Psychology are identified as having somewhat 'too much' time. The remaining seventeen course and skill categories have been identified as having an appropriate amount of time devoted to them.

4. Repetition

Table 16 indicates the amount of 'unnecessary' repetition that alumni reported to exist in the Biological Science courses. The mean for this group is 2.98 (extremely close to 'satisfactory') with lower and upper confidence intervals respectively of 2.94 and 3.48. The standard deviation for scores in this group is .717.

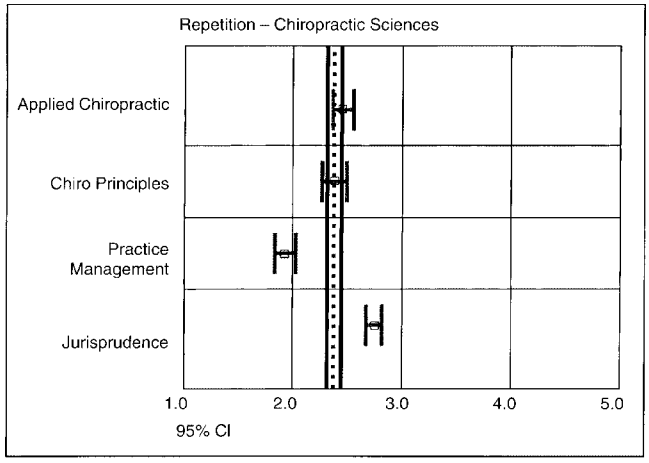
Table 16
Repetition – Biological Sciences



The main course category identified as not having enough 'necessary' repetition for the Biological Sciences is Nutrition (mean of 2.31). To a lesser extent, the alumni included Anatomy in this category. Again, Embryology, and Histology with means respectively of 3.32 and 3.42 have been identified as having somewhat more 'unnecessary' repetition than was seen to be appropriate. The remaining course categories in the Biological Sciences were reported to be satisfactory.

Table 17 identifies the degree of 'unnecessary' repetition perceived by the alumni in course categories in the Chiropractic Principles department. The overall mean for this group is 2.38 ('too little') with lower and upper confidence intervals of 2.31 and 2.45 respectively. The standard deviation for this group of scores is .8600.

Table 17
Chiropractic Sciences – Repetition

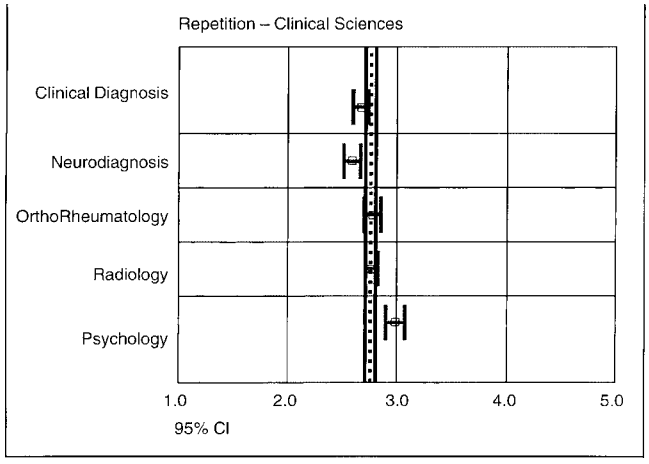


All course categories in this group were seen by the alumni as having 'too little' repetition in their deliveries. Practice Management, Applied Chiropractic and Chiropractic Principles are reported as having 'too little' repetition of course material. Jurisprudence is closest in terms of repetition that is perceived to be 'satisfactory'.

Table 18 portrays the degree of 'unnecessary' repetition

that alumni perceived to exist in the Clinical Sciences department. The mean for this group is 2.75 ('too little') while the lower and upper confidence intervals are 2.71 and 2.80 respectively. The standard deviation for this group of scores is .6720.

Table 18
Repetition – Clinical Sciences

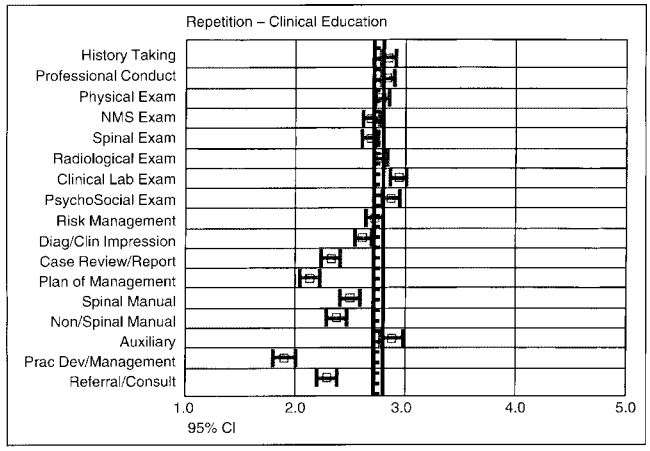


Three out of five course categories in this group (Clinical Diagnosis, Neurodiagnosis, and Radiology) are seen by the alumni as 'satisfactory' in terms of the repetition associated with their deliveries. OrthoRheumatology (mean of 2.34) is the only course category in this department that is identified as having a degree of 'too little' repetition while Psychology (mean of 3.20) is rated as having slightly 'too much' repetition.

Table 19 portrays the degree of repetition in the skill categories in the Clinical Education department. The overall mean for the group of scores within this table is 2.60 ('too little'). The lower and upper confidence intervals are 2.56 and 2.64 respectively while the standard deviation is .717.

All skill categories in this department are seen by the alumni as having 'too little' repetition associated with them. However, the six out of seventeen skill categories (35%) most noted are Case & Review Report, Plan of Management, Spinal Manual, Non Spinal Manual, Practice Development and Management, and Referral and Consultation. The remaining eleven (65%) of the skill categories are also identified as having 'too little' repetition

Table 19
Repetition – Clinical Education



although to a much lesser degree than the above mentioned. No categories were seen to have 'too much' repetition in the Clinical Education department.

Summary – Repetition: Tables sixteen through nineteen show all of CMCC's undergraduate departments according to the degree of repetition perceived by the alumni in the course and skill categories. The overall mean for scores within this table is 2.68 ('too little'). The lower and upper confidence intervals are 2.64 and 2.98 respectively while the standard deviation is .2889.

In summary, a total of fourteen out of thirty five (40%) course and skill categories are identified as concerns in terms of repetition. Four of these course and skill categories are perceived to have too much repetition, and are located in the Biological Sciences (Embryology, Histology, Microbiology, and Biochemistry). The remaining ten course and skill categories were reported to have a degree of 'too little' repetition. One of these courses is in the Biological Sciences (Nutrition), three are in the Chiropractic Sciences (Applied Chiropractic, Chiropractic Principles, and Practice Management) while six are located within Clinical Education (Case Review & Report, Plan of Management, Spinal Manual Therapy, Non Spinal Manual Therapy, Practice Development & Management Skills, and Referral & Consultation). The remaining twenty one course and skill categories (60%) are identified as 'satisfactory' in terms of repetition.

Overview

Table 20 serves comprehensively to identify and organize those course and skill categories, that have been found to merit attention according to the four variables of Preparation (P), Content (C), Time (T), and Repetition (R). A minus (–) beside each checkmark indicates below 'good' while a plus (+) indicates above 'good' for each variable.

Table 20 identifies aspects of the 35 course and skill categories associated with the CMCC undergraduate chiropractic program that merit at least some attention in terms of their continual improvement. This table does not list those course and skill categories that have been perceived by the alumni to be of positive benefit. It can be observed that while the concerns associated with some of the course and skill categories are of an 'excess' (i.e., noted by a +) nature (e.g., Time in Psychology), others have concerns that are of a 'deficiency' (i.e., noted by a –) nature (see Preparation, Content, Time, and Repetition for the course and skill categories in Clinical Education). All of the check marks represent concerns that are statistically significant. Each check mark represents a deviation from the mean that is beyond the lower and/or upper limits of the confidence interval (i.e., due to factors other than chance alone).

Discussion

Alumni reported that all of CMCC's departments in the Undergraduate Studies program prepared them well for practice. Although one department (Clinical Sciences) was rated above, and three departments (Biological Sciences, Chiropractic Sciences, and Clinical Education) were rated below the overall CMCC mean of 3.49, alumni responded with an overall rating of 'good' for the *Preparation for Practice* variable.

Two departments (Biological Sciences, and Chiropractic Sciences) were rated below, and the other two (Clinical Sciences, and Clinical Education) were rated above the overall CMCC mean of 3.51 ('good') for *appropriateness of content* in the CMCC undergraduate program referred to in this study.

The overall CMCC mean for *appropriateness of time* allotted to the program is 2.70 which is below the (3.00) mean of 'satisfactory'. Of the four departments, three were rated below the mean (Chiropractic Sciences, Clinical Sciences, and Clinical Education) while Biological Sciences was rated by the alumni as having 'slightly' too much time allotted to its department.

The alumni gave the overall undergraduate program a rating of 2.68 ('somewhat' too little) for the *level of repetition* that they thought to be necessary. Of the four departments, two (Chiropractic Sciences, and Clinical Education) were identified by the alumni as in most need of more repetition of course material. The remaining two (Biological Sciences, and Clinical Sciences) were reported to have close to a 'satisfactory' rating for repetition of course material.

In a comparison of the four departments, the alumni have rated Clinical Sciences and Clinical Education as providing them with the highest preparation for practice, and with the most appropriate content for professional practice. With the exception of the Clinical Exam skills, they identified all other skill categories in the Clinical Education department as having 'too little time', and 'too little repetition' associated with their deliveries. In addition, the Chiropractic Sciences department was also identified as having 'too little time', and 'too little repetition' associated with its delivery.

All standard deviations associated with the responses from the alumni are less than 1.000. This result helps to confirm the 'tightness' or 'consistency' in responses across the sample with regard to how the course and skill categories studied related to Preparation, Content, Time, and Repetition.

Conclusion

This study has shown that a linkage exists between education and professional practice. The *CMCC Alumni Curriculum Development Survey* is an instrument that may be used as a reliable method for analysing the CMCC undergraduate chiropractic program. Data collected through this survey provides not only a 'snapshot' view of how well the CMCC program is preparing its graduates for professional practice, but also a reliable foundation for program development, evaluation, and improvement. This foundation can serve as a meaningful referent in evaluating the results of future program efforts. Consequently, ongoing decisions and efforts for change may be supported by data about how the program is achieving its mission of preparing its students for professional practice.

Acknowledgements

Very special appreciation goes out to the CMCC alumni

Table 20
Trend Analysis in the CMCC Course and Skill Categories

Biological Sciences	**P**	**C**	**T**	**R**
1. Anatomy			✓–	✓–
2. Embryology	✓–	✓–	✓+	✓+
3. Histology	✓–	✓–	✓+	✓+
4. Microbiology			✓+	✓+
5. Pathology			✓+	
6. Lab Diagnosis			✓+	
7. Biochemistry			✓+	✓+
8. Nutrition			✓–	✓–
Chiropractic Sciences				
1. Applied Chiropractic			✓–	✓–
2. Chiropractic Principles			✓–	✓–
3. Practice Management	✓–	✓–	✓–	✓–
4. Jurisprudence			✓–	✓–
Clinical Sciences				
1. Clinical Diagnosis			✓–	✓–
2. Neurodiagnosis			✓–	✓–
3. OrthoRheumatology			✓–	✓–
4. Radiology			✓–	✓–
5. Psychology			✓+	✓+
Clinical Education				
1. History Taking			✓–	✓–
2. Professional Conduct			✓–	✓–
3. Physical Exam			✓–	✓–
4. Neuromusculoskeletal Exam			✓–	✓–
5. Spinal Exam			✓–	✓–
6. Radiological Exam			✓–	✓–
7. Clinical Lab Exam			✓–	✓–
8. Psycho-Social Exam			✓–	✓–
9. Risk Management			✓–	✓–
10. Diagnosis and Clinical Impressions			✓–	✓–
11. Case Review and Reporting			✓–	✓–
12. Plan of Management			✓–	✓–
13. Spinal Manual			✓–	✓–
14. Non-Spinal Manual			✓–	✓–
15. Auxiliary Therapy			✓–	✓–
16. Practice Development and Management	✓–	✓–	✓–	✓–
17. Referral and Consultation	✓–	✓–	✓–	✓–

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