AUDIT OF TEACHING ASSIGNMENTS

An Integrated Analysis of Teacher Educational Background and Courses Taught

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NOVA SCOTIA
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Charts and Tables

Executive Summary

- Teaching assignments for active teachers in the 2006–2007 school year were analysed with a view to assessing the extent to which public school courses are being taught by teachers with related educational backgrounds.
- For the purposes of this analysis, related educational background is defined as an academic major or minor that is related to the subject taught. For each subject included in the analysis, departmental staff with expertise in the subject areas identified a list of related academic majors and minors—those that have significant mandatory coursework in the subject area. It should be noted that teachers may have completed coursework in a subject without having it as an academic major or a minor; however, this coursework was not included in this analysis.
- The list of related educational backgrounds is intended to be inclusive and based on a scale from "somewhat related" to "directly related." This approach was taken to ensure that as much weight as possible was given to each educational background with respect to the courses taught.
- The analysis was focussed on selected subjects in the public school program; 11 subject areas were chosen for analysis (five junior high and six senior high school subjects). These subjects were identified by the department and school boards as those that they were most interested in examining with respect to the educational background of teachers.
- This methodology did not include elective courses outside a major or minor or a concentration of courses less than a minor (18 credits). In addition, because undergraduate degree requirements are not identical with respect to required courses, the determination of related educational background should be considered an indicator of the extent to which a teacher has sufficient content knowledge for courses being taught. It should not be considered a detailed analysis of each teacher's completed credit hours.
- Several contextual factors were considered during development of this report, including the following:
  - Resource limitations related to the teacher assignment process. Teachers are often assigned three or more courses; given that teachers usually have only one major and one minor, in many cases teachers are immediately faced with at least one assignment outside of their major and minor.
  - The middle school approach followed in some Nova Scotia schools focusses on teaching teams whereby students should not have an excessive number of teachers and that transitions should be minimized. This approach can create challenges with respect to matching a teacher's academic background to the subjects taught.
- Preliminary analysis was conducted in fall 2006 on teachers active in 2004–2005. In 2004–2005 approximately half of junior high teachers had a related post-secondary degree for the subjects they were teaching. This was true for 63 percent of senior high teachers. It appeared that newly hired teachers were not better matched to their new assignments in comparison to the overall results.
- The analysis of active teachers who taught in 2006–2007 showed that there has been an increase in the overall number of teachers teaching in their area of expertise. Sixty-three percent of junior high and 67 percent of high school teachers had a related educational background with respect to the courses they taught.
- With respect to teaching effort, in 2006–2007, 70 percent of the courses included in the analysis were taught by teachers with related educational backgrounds (67 percent of junior high courses and 73 percent of senior high courses).

- The analysis indicates that efforts are being made to assign teachers to courses in which they have related educational backgrounds.
- At both junior and senior high levels, the degree to which courses were taught by teachers with related educational backgrounds varied by subject. In general, more subjects at the senior high level were taught by teachers with related educational backgrounds.
- The analysis identifies several subject areas of particular concern with respect to the percentage of courses taught by teachers without related educational backgrounds. These include math (junior and senior high), English (junior high), science (junior high), and history (senior high).
- The most significant subject area of concern is math, particularly at the junior high level where only 37 percent of courses are being taught by teachers with a related educational background.

Introduction

The Nova Scotia Department of Education has undertaken an analysis to examine the extent to which selected Public School Program courses are taught by teachers with or without related post-secondary education. It is important to explore this issue to ensure that Nova Scotia students receive the highest quality of education.

This report includes information on selected subject areas in the Public School Program and on the number of courses within these subject areas taught in the 2006–2007 school year by teachers with or without a related educational background.

Preliminary work was undertaken in fall 2006 to examine teaching assignments of active junior and senior high school teachers in 2004–2005, and whether their educational background related to the courses they taught. Data from 2004–2005 was the most current available in the Department when the study was initiated.

These preliminary data highlighted significant concerns with regard to the number of teachers who were teaching subjects for which they did not have related post-secondary degrees.

Two issues prompted further investigation. First, with the higher number of teacher retirements in recent years and the efforts to hire new graduates in the areas of need through the early hiring job fair, it was felt that there would be a closer alignment of post-secondary backgrounds and subjects being taught in 2006–2007 than was seen in the earlier data. Secondly, it was felt that correlating the level of teaching effort with the numbers of teachers who did or did not have a related post-secondary background would provide a clearer picture of the degree to which selected subjects are being taught by teachers with knowledge of their subject fields.

Methodology

The report examines courses taught by active junior high and senior high school teachers in the 2006–2007 school year, with the objective of determining the extent to which teaching is being carried out by teachers who do not have a post-secondary background related to the subject being taught.

This study focusses on all reported majors and minors received through teachers' university education (outside of a BEd program). All academic majors and minors (outside of the BEd) held by each teacher included in this analysis were considered when determining whether the major and/or minor should be considered related to the course taught. The analysis does not include other background knowledge or training that teachers may have completed, such as professional development opportunities, in-services, summer institutes, or courses toward a diploma and/or certificate training.

In order to focus the analysis, 11 subject areas (5 junior high and 6 senior high school subjects) were selected. These subjects were identified by the department and school boards as those that they were most interested in examining with respect to the educational background of teachers. All courses taught in 2006–2007 in each school board for these 11 subject areas were included in the analysis.

The data used to produce this report were provided by each school board. Each school board was asked to provide information on each active teacher who taught a course(s) in the identified 11 subject areas in 2006–2007. In addition to academic majors and minors, boards were asked to indicate which specific courses each teacher was assigned and how many sections they taught for that course. This methodology was used to correlate the level of teaching effort with the numbers of teachers who did or did not have a related post-secondary background.

Data used in this report pertains to active teachers in 2006–2007 who were classified as permanent, permanent part-time, permanent job-sharing, term, probationary, or probationary part-time.

The following subjects were included in this analysis:

Junior High	**Senior High**
English	Biology
Math	Chemistry
Physical Education	English
Science	History
Social Studies	Math
	Physics

Several methodological matters with respect to the data and analysis should be considered when interpreting the results of this report.

Defining Related Educational Background

The Department of Education does not maintain data for each teacher on credit hours earned in university programs. Therefore, a teacher was considered to have a related educational background in the course being taught if that teacher had a post-secondary major or minor in that subject or a related subject. Department staff with expertise in each subject area identified majors and minors with significant mandatory coursework in that subject area. Differences in required content knowledge between junior and senior high were considered. Majors and minors for each subject were identified as either "directly related" (providing a significant amount of training particular to the subject taught) or "somewhat related" (providing some post-secondary training particular to the subject taught).

Because university degree requirements are not identical with respect to required courses, and because some students may take elective courses not reflected in their major or minor, this methodology does not provide a precise analysis of academic coursework undertaken by each teacher. See Appendix A for a complete listing of majors and minors determined to be related to each junior and senior high school subject included in this report.

Selected Subject Areas

The analysis focussed on 11 subject areas in junior and senior high school. The analysis should not be interpreted as applying to all courses or all teachers in the public school system.

Missing Data

Data on active teachers and their educational backgrounds were submitted by school boards. It was assumed that all teachers who taught courses in the 11 subject areas were included. In a small number of cases, information on educational background was not supplied. Where possible, this information was obtained from the CEDAR system, which is managed by the department; however, for some teachers it was not possible to obtain the data, and they were excluded from the analysis. Therefore, the total number of courses taught and the total number of teachers in the following tables and charts may be less than actual numbers. It should also be noted that for some subject areas the total number of courses included in the analysis was relatively small, and consequently a change in even one teacher would affect overall percentages. Therefore, the number of courses included in the analysis should be considered when reading the course-level results.

Context

Importance of Teacher Content Knowledge

This report focusses on teacher post-secondary educational background with respect to courses taught. At the secondary level, it is imperative that teachers have content knowledge in the subject area(s) they teach. Content knowledge is based primarily on university studies.

Although content knowledge is a critical component of effective teaching, it cannot be looked at in isolation. For example, if a teacher has expert content knowledge but is unable to communicate effectively in the language of instruction, then the expertise is not accessible to the students. Effective teaching is a matter of balancing good pedagogy with subject matter expertise.

Factors That Contribute to Effective Teaching

There are multiple factors, in addition to educational background, that contribute to effective teaching. These factors include skills related to pedagogical knowledge and instructional techniques.

Pedagogical knowledge relates to knowledge of and ability to use various strategies and styles of instruction. These skills form a key component of overall teaching effectiveness and include knowledge of a variety of instructional and assessment strategies, effective communication skills, ability to relate classroom learning to home/community/workplace applications, and knowledge of classroom management and organization.

Instructional skills contribute significantly to overall teaching effectiveness. These skills include the ability to create a collaborative, supportive learning environment and to design coherent instruction and learning experiences that directly address specific curriculum outcomes. They also include using extensive knowledge of content; understanding of cultural differences to design instruction; assessments to inform instruction; knowledge of pedagogy to ensure student access to content and to actively engage students in learning; knowledge of students' learning styles/preferences; knowledge of ways to support the learning of students with special needs; and knowledge of learning resources, including technology.

Ensuring Competency in Content Knowledge

Certification

School boards are required under the Education Act to ensure that teachers hold a teacher's certificate or permit. Students must complete a minimum of five years of undergraduate education[1]. These five years consist of a minimum of three years of undergraduate education and two years of an approved program of professional studies. Included in the three years of undergraduate education are specific academic content requirements for those preparing to teach at the elementary or secondary levels.

Effective August 1, 2005, an endorsation process was implemented. Endorsation recognizes the principle that teachers must be competent in both the subject area and the methodology associated with that subject area. A major endorsation requires a minimum of 30 credit hours of study, and a minor endorsation requires a minimum of 18 credit hours of study, in a discipline taught in the public schools of Nova Scotia, as well as the study of prescribed teaching methodology. Please see Appendix C for the list of endorsations.

Supporting Teachers Who Lack Content Knowledge

Content knowledge requires that the teacher continue to maintain currency in the subject area they teach. Understanding of any subject can and does change over time. It is the responsibility of the teacher to keep abreast of new developments in the subject area. Several avenues of support are made available for teachers who may be teaching a course for which they lack current content background. These supports include providing professional learning resources and high quality teaching resources (print, media, and online); increasing the number of mentors and coaches and providing ongoing training for mentors and coaches; providing ongoing high quality professional development and training for board leaders (lead administrators, lead teachers, leadership teams); and working with universities to provide certificate or graduate programs.

Hiring and Assignment Processes

The hiring of teachers in the Nova Scotia public education system is governed by local agreements between each regional school board and the Nova Scotia Teachers Union, as well as by school board hiring policies. Local agreements and hiring policies articulate the need to ensure that the successful candidate for a teaching position has appropriate educational qualifications, ability, and experience relevant to the position. This also applies to transfers from one school to another. Hiring processes are also designed to ensure a transparent, fair, and equitable hiring process.

The teaching assignment process happens primarily at the school level. Staffing assignments within each school are determined by the school's administration team. However, challenges related to resource limitations have been reported by school boards. During the assignment process, it is common practice for teachers to be assigned three or more subjects due to scheduling demands. Most teachers usually have only one academic major and one minor, because of this some teachers are required to teach in at least one subject area outside of their major and minor.

1 Applies to students starting university August 1, 2000, and thereafter.

Challenges Faced by Small and Rural Schools

It is recognized that some schools face unique challenges related to school size, composition, and location. More remote regions of the province have reported difficulty in recruiting and retaining qualified teachers. This is particularly challenging in specific subject areas of need, where a smaller overall pool of qualified teachers is available. Even in cases where teachers with related educational backgrounds are available on a provincial basis, different regions of the province may not have access to qualified educators in all the various subject areas. At the school level, an oversupply in one subject would likely mean that some teachers would be required to take on new subjects.

Junior high and middle schools may particularly face this dilemma as they balance staffing allocation requirements (which may result in one teacher teaching several subject areas) with the need to ensure that teachers have expertise in course content for the majority of courses that they teach. In addition, schools that follow the middle school format focus on teacher teams and interdisciplinary teaching across traditional subject boundaries. This approach may increase the possibility that teachers will teach in multiple subject areas and therefore be less likely to have educational background related to all subjects they teach.

Language Requirement for French Immersion Courses

Schools that offer French Immersion courses also face a significant challenge with respect to ensuring teacher competency in French as well as subject content knowledge. Recruitment of teachers qualified to teach in French is becoming increasingly difficult as the province faces an overall shortage of French teachers; and school boards must balance between the need to recruit teachers who can competently instruct in the French language and the need to ensure expertise in the subject areas offered in French.

Results

The data was examined to determine the extent to which courses are taught by teachers who have a major or minor related to the subject area. This section reports on the overall and individual subject results.

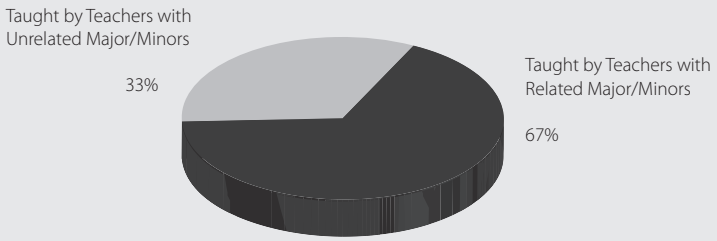
For summarization purposes, "directly related" and "somewhat related" majors and minors are grouped together and referred to as "related background."

Overall Results

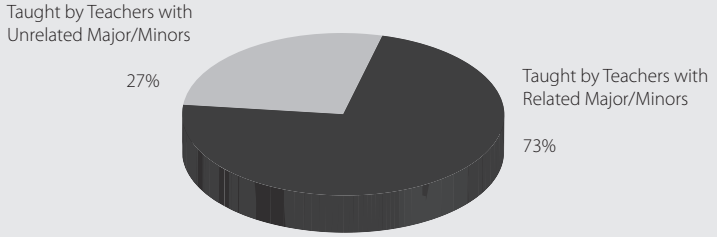
Overall, 67 percent of junior high courses included in the analysis were taught by teachers with a related educational background. This is true of 73 percent of senior high courses examined.

Chart 1: Courses Taught by Teachers with Related Background

Junior High School Courses



Senior High School Courses



Subject-Level Results

At both junior and senior high levels, the degree to which courses were taught by teachers with related educational background varied by course. In general, more courses at the senior high level were taught by teachers with related educational backgrounds. See Appendix B for additional detail on each subject area.

Chart 2: Junior High Courses Taught by Teachers with Related Background

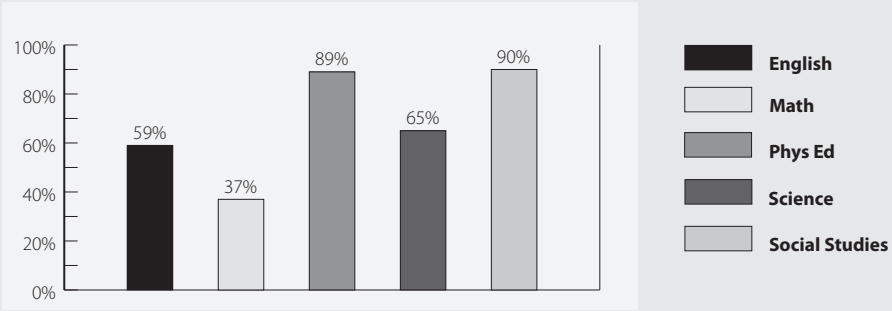
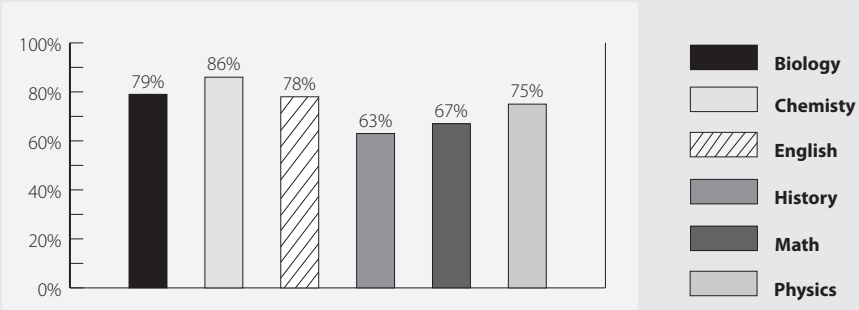


Chart 3: Senior High Courses Taught by Teachers with Related Background



Several subject areas at both the junior and senior high school level had a relatively lower percentage of courses taught by teachers with related educational backgrounds. These subject areas are:

Junior High	Senior High
Math	History
English	Math
Science	

The most significant subject area of concern is math, particularly at the junior high level with only 37 percent of courses taught by a teacher with a related educational background. Junior high English (59 percent) and science (65 percent) also had relatively fewer courses taught by teachers with related backgrounds. At the senior high level, on average, 80 percent of science courses including biology, chemistry and physics were taught by teachers with related educational backgrounds. Approximately two-thirds of history and math courses were taught by a teacher with a related background.

Analysis by Course Level

Additional analysis was conducted on senior high school courses that have advanced, academic, and graduation levels (math, biology, chemistry, physics, and English)[2]. The purpose of this analysis was to determine whether there is a relationship between course level and the number of courses taught by a teacher with a related background.

More academic and advanced-level courses were taught by teachers with related educational backgrounds compared to graduation-level courses. The following table provides more detail with respect to the number of courses taught within each subject area for each course level.

Table 1: Courses Taught by Teachers with Related Background by Course Level

	# Course Taught by Teachers with			% Course Taught by Teachers with	
	Total	Related Major/Minor	Unrelated Major/Minor	Related Major/Minor	Unrelated Major/Minor
Senior High Advanced Courses					
Math (Adv)	450.5	346.5	104	76.9%	23.1%
English (Adv)	67	50	17	74.6%	24.4%
Biology (Adv)	66	52	14	78.8%	21.2%
Chemisty (Adv)	60	53	7	88.3%	11.7%
Physics (Adv)	34	25	9	73.5%	26.5%
Senior High Academic Courses					
Math (Acad)	769.5	544.5	225	70.8%	29.2%
English (Acad)	1333	1024	309	76.8%	23.2%
Biology (Acad)	400	322	78	80.5%	19.5%
Chemisty (Acad)	307	260	47	84.7%	15.3%
Physics (Acad)	239	182	57	76.2%	23.8%
Senior High Graduation Courses					
Math (Grad)	503.5	279.5	224	55.5%	44.5%
English (Grad)	166	126	40	75.9%	24.1%
Biology (Grad)*	28	17	11	60.7%	39.3%

*Only the Halifax Regional School Board offers senior high biology at the graduation level.

2 The course levels offered vary by board. Advanced English was not offered by Annapolis Valley and CSAP; advanced chemistry was not offered by CSAP and Tri-County; advanced biology and advanced physics were not offered by CSAP; and only Halifax offered graduation—level biology.

Courses Offered in French Immersion

Data was also examined respect to the number of French immersion courses being taught by a teacher with a related background.

Overall, only 58 percent of French immersion courses were taught by a teacher with an educational background related to the subject area. This can be compared to the overall subject results where 70 percent of all courses (including French immersion courses) were taught by a teacher with a related educational background.

Table 2: French Immersion Courses Taught by Teachers with Related Background

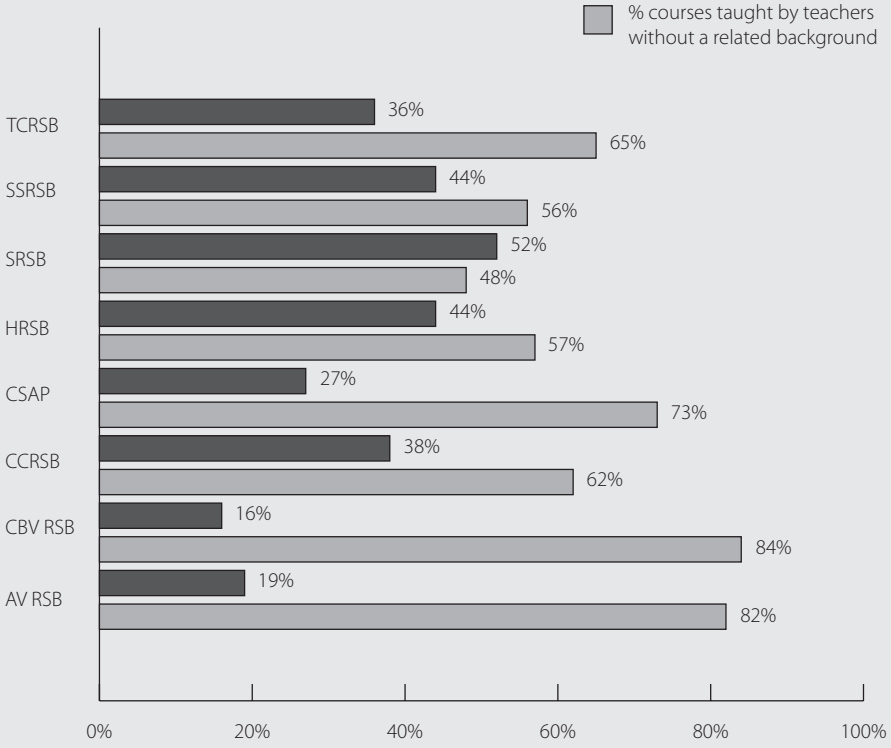
	# French Immersion Courses Taught by Teachers with			% French Immersion Courses Taught by Teachers with	
	Total	Related Major/Minor	Unrelated Major/Minor	Related Major/Minor	Unrelated Major/Minor
Junior High					
Social Studies	99	88	11	89%	11%
Science	87	36	51	41%	59%
Math	45	16	29	36%	64%
Physical Education	8	3	5	38%	62%
	239	**143**	**96**	**60%**	**40%**
Senior High					
Chemistry	7	7	0	100%	0%
Biology	37	28	9	76%	24%
Math	16	12	4	75%	25%
History	91	33	58	36%	64%
	151	**80**	**71**	**53%**	**47%**

Some French immersion subject areas, such as history at the senior high level and science and physical education at the junior high level, had significantly fewer courses taught by teachers with related backgrounds, when compared to overall results. However, senior high chemistry and math had a higher percentage of French immersion courses taught by teachers with related backgrounds when compared to overall results.

Results by Board

The percentage of courses taught by teachers with related educational backgrounds was analysed by school board. The results for each subject area varied by board. Some of the most significant variations between boards were in the identified subject areas of concern: junior high math, social studies, and English and senior high math and history. Within the identified subject areas of concern, therefore, some boards do have relatively higher numbers of courses taught by teachers with related backgrounds, even though the overall results appear poor.

Chart 4: Junior High Math Courses



Key

TCRSB Tri-County Regional School Board

SSRSB South Shore Regional School Board

SRSB Strait Regional School Board

HRSB Halifax Regional School Board

CSAP Conseil scolaire acadien provincial

CCRSB Chignecto-Central Regional School Board

CBVRSB Cape Breton-Victoria Regional School

AVRSB Annapolis Valley Regional School Board

Chart 5: Junior High English Courses

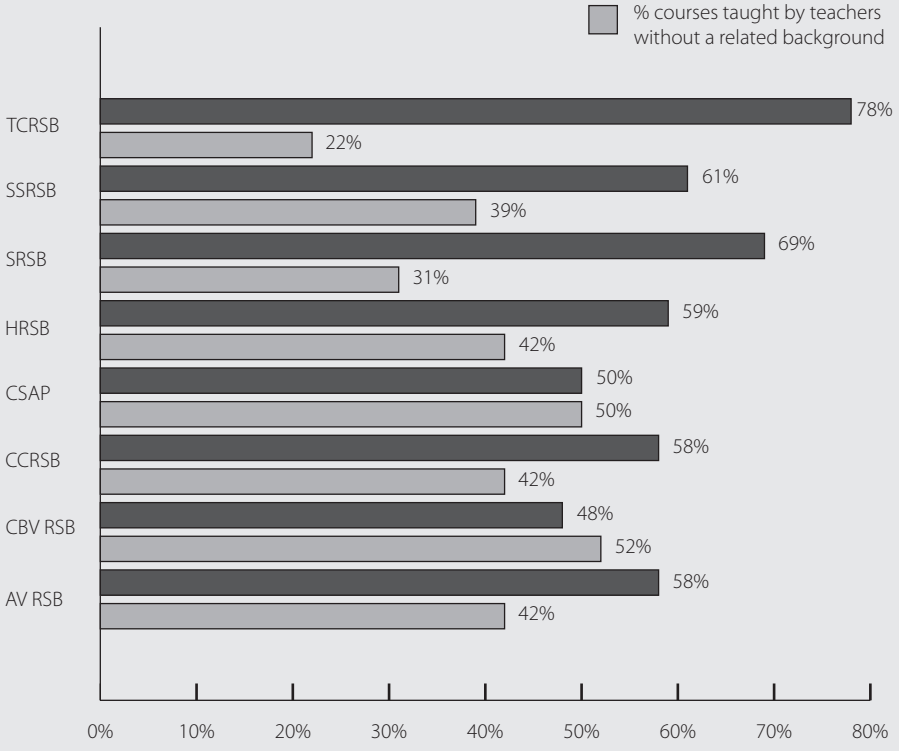


Chart 6: Junior High Physical Education Courses

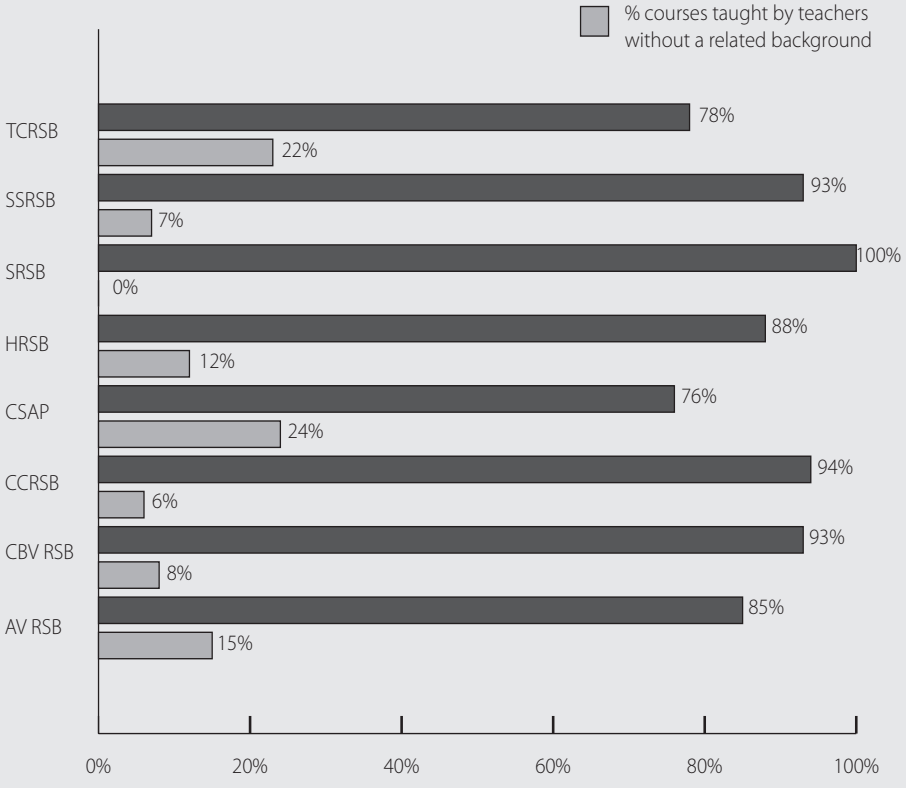


Chart 7: Junior High Science Courses

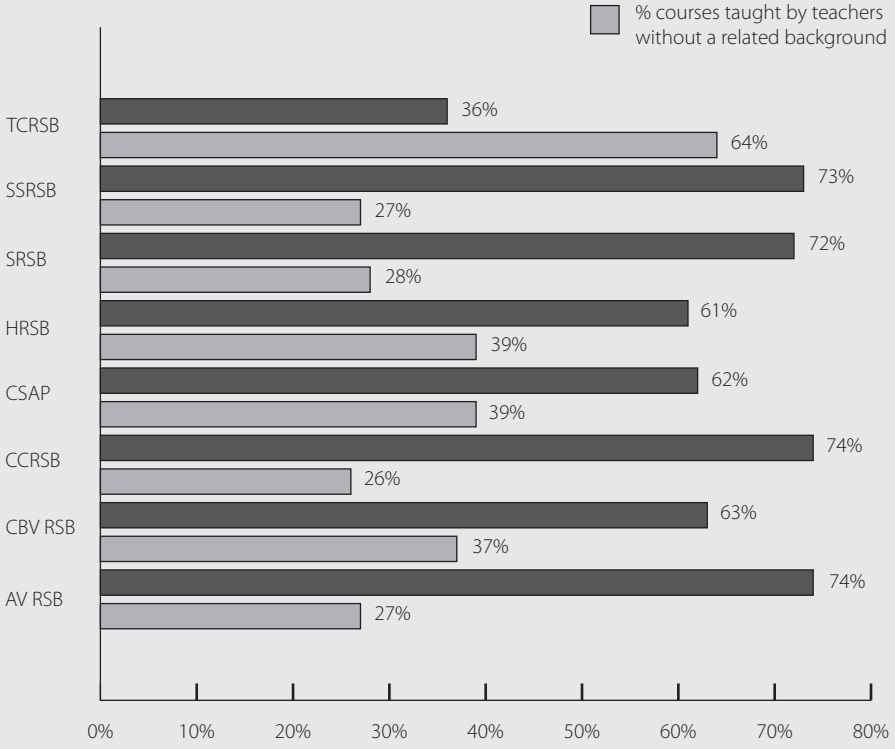


Chart 8: Junior High Social Studies Courses

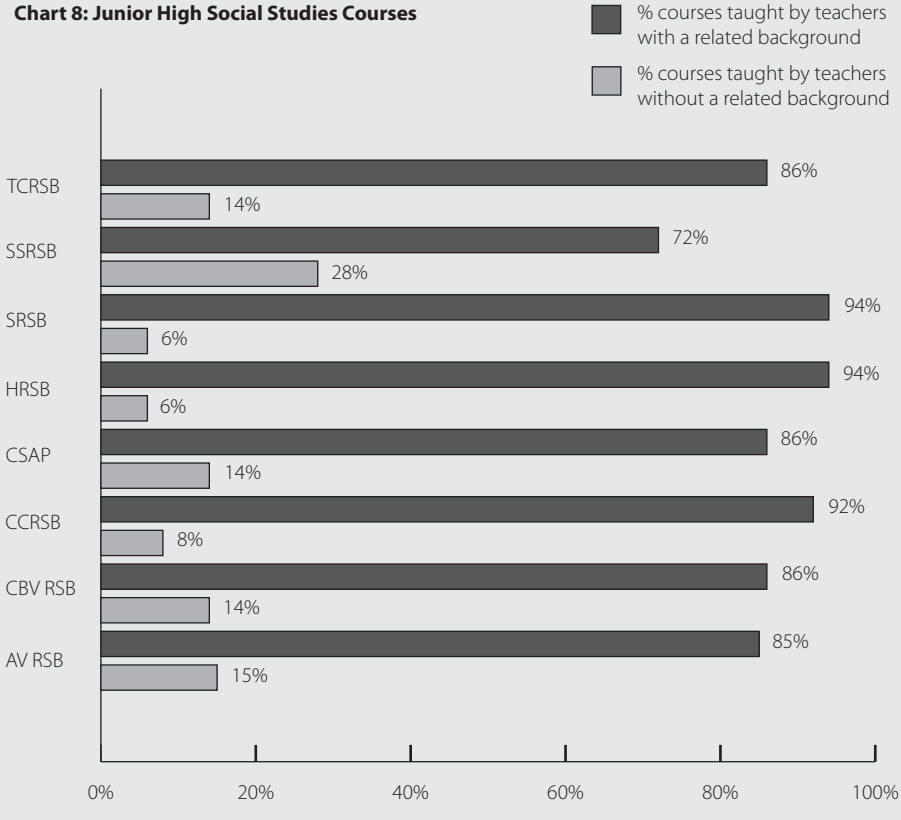


Chart 9: Senior High History Courses

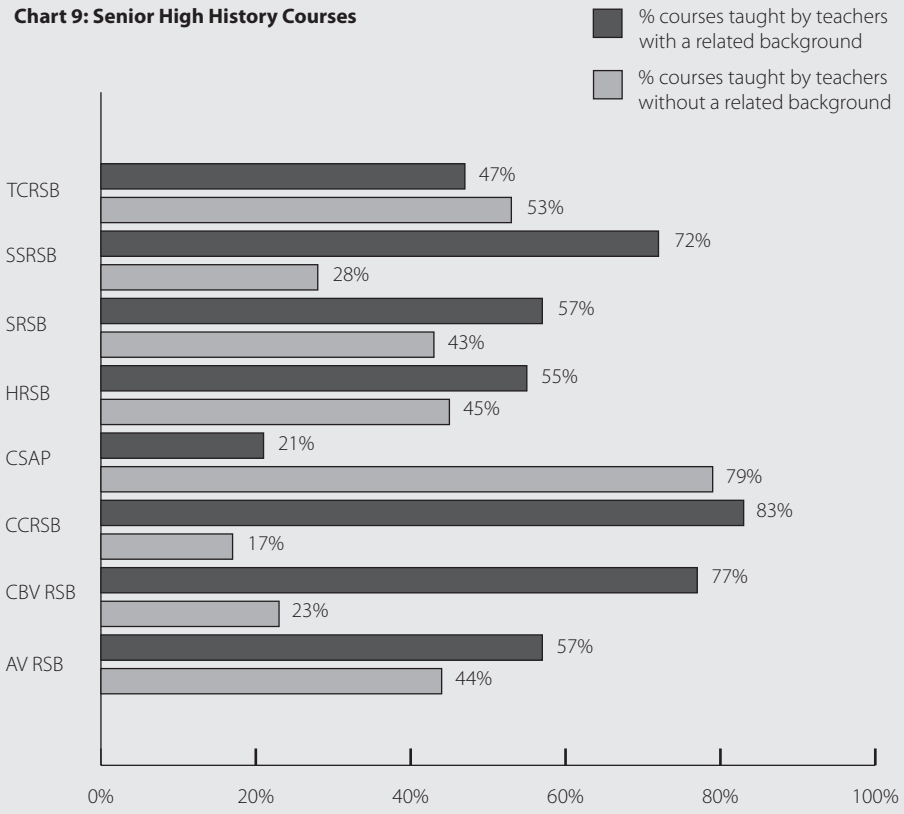


Chart 10: Senior High Math Courses

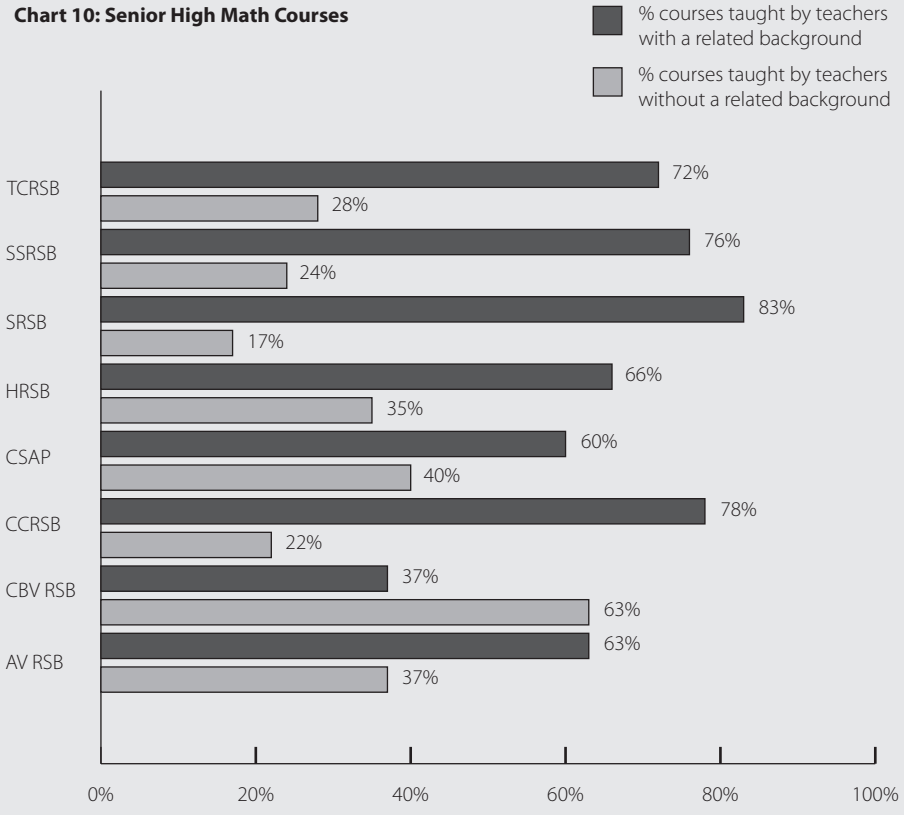


Chart 11: Senior High English Courses

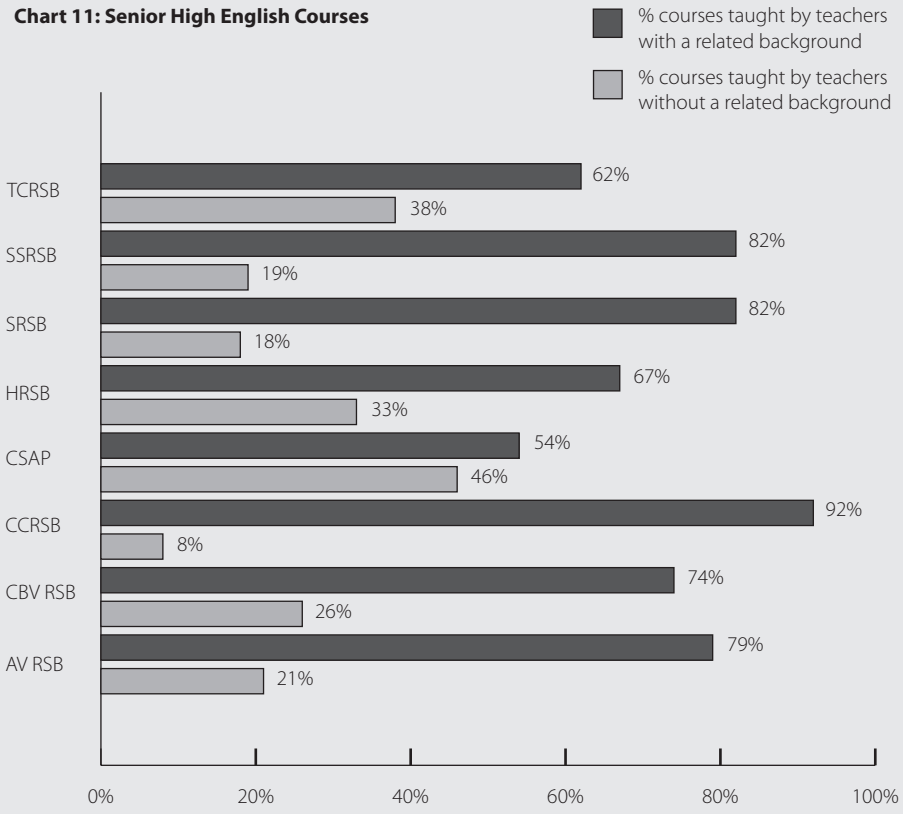


Chart 12: Senior High Physics Courses

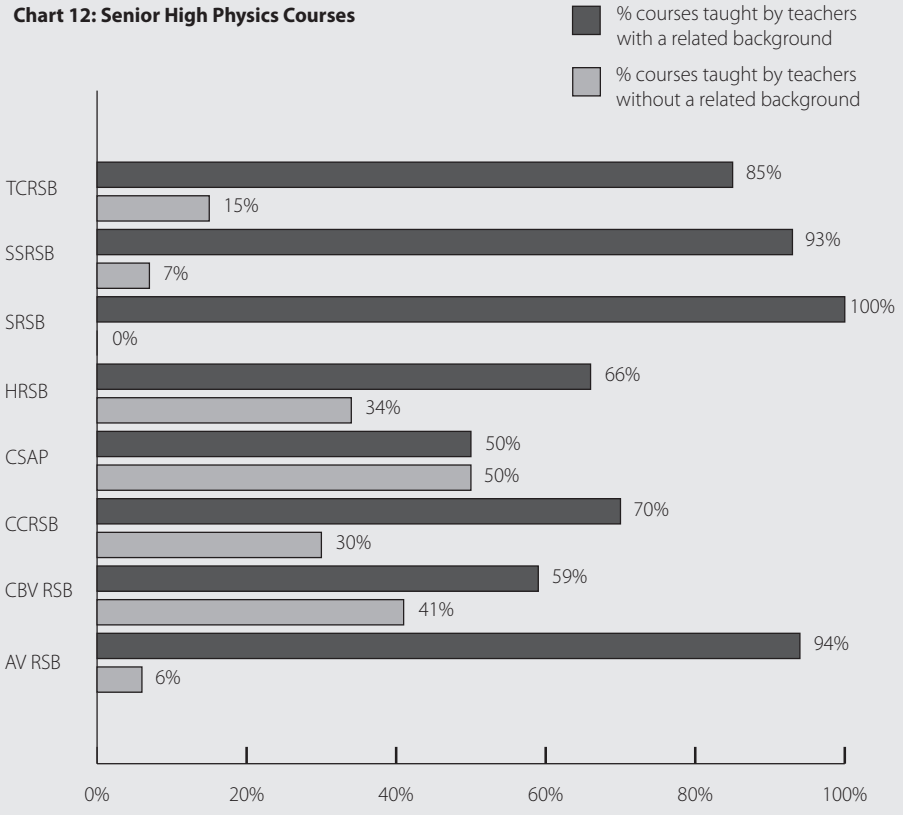


Chart 13: Senior High Biology Courses

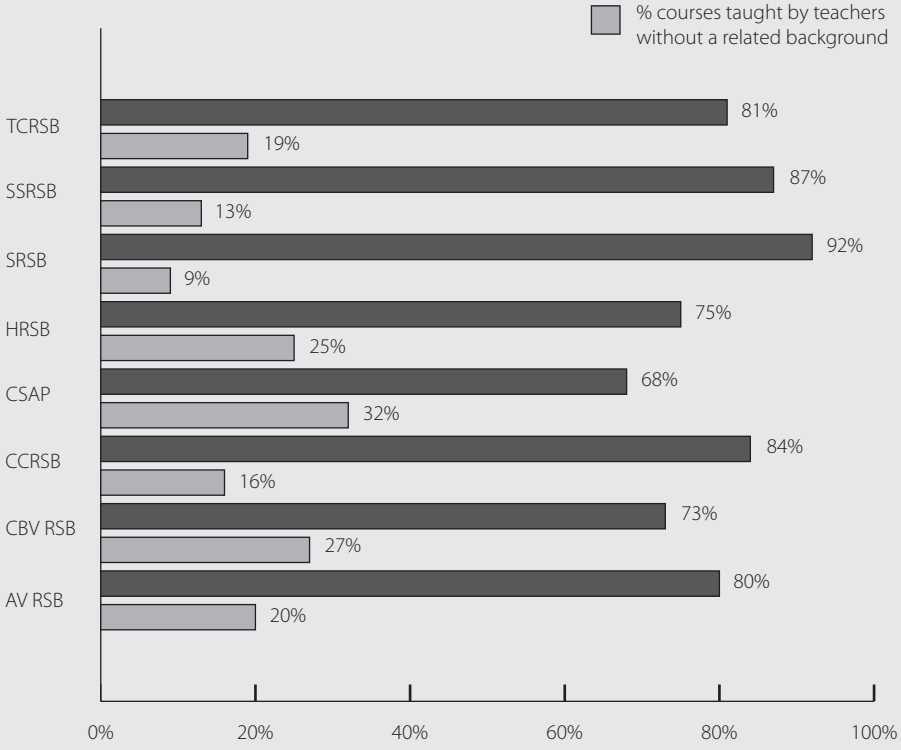
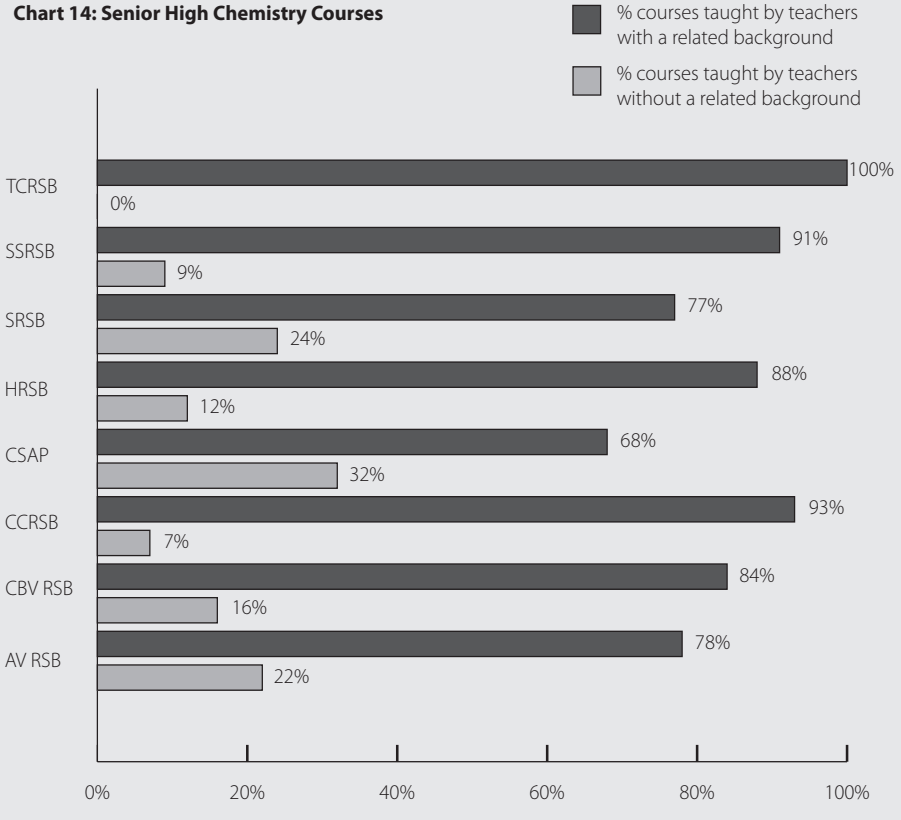


Chart 14: Senior High Chemistry Courses



Teacher Educational Background

The data were also examined with respect to the number of teachers who had a related educational background in the subjects being taught. Overall, 63 percent of junior high teachers in 2006–2007 had educational backgrounds related to the subjects. This was true of 67 percent of senior high teachers.

Analysis was undertaken to determine the most common educational backgrounds of those teachers who were not teaching in their areas of expertise. This analysis was undertaken for the identified subject areas of concern. The three most common majors and minors for those teachers were as follows.

Table 3: Majors/Minors of Teachers Not Teaching in their Areas of Expertise

Subject	Teachers with Unrelated Background		Majors	Minors
	#	%	Top Three	Top Three
Junior High				
Math	353	66%	Biology Physical Education French	English Psychology Biology
English	219	44%	History Physical Education Sociology	Psychology History Sociology
Science	186	36%	English French History	English French Political Science
Senior High				
History	106	43%	French English Physical Education	English French Social Studies
Math	187	41%	Biology Physical Education Chemistry	Biology Chemistry Psychology

The most common majors and minors for junior high subjects and for senior high history tended to be in social science and arts disciplines. Most of the majors and minors for senior high math teachers included above were from science disciplines.

The table above shows that senior high school teachers with expertise in science disciplines tend also to be assigned math courses. For the purposes of this study, it was determined by subject matter experts that biology and chemistry majors and/or minors would not generally provide sufficient expertise in math content knowledge.

This study was not able to examine whether there are teachers with educational backgrounds in the subject areas of concern who are not currently teaching those courses, because not all include public school teachers were included in the analysis. However, in 2004–2005, of approximately 240 junior high teachers who had a major or minor related to math, about half were not teaching math. This indicates that the available pool of junior high math teachers may not be fully utilized.

Data Comparison: 2004–2005 and 2006–2007

Since 2004–2005, there has been an overall increase in the number of teachers who are teaching in their area of expertise. Eight percent more junior high and 4 percent more senior high teachers in 2006–2007 had educational backgrounds related to the courses taught, compared to 2004–2005.

The degree of improvement varied by subject, but was relatively stronger for math and English. There was a 14 percent increase in the number of junior high math teachers with related educational backgrounds, and an 11 percent increase for senior high math teachers. In English, the improvement was 12 percent in junior high and 6 percent in senior high; while in senior high chemistry, an additional 7 percent of teachers had related educational background in 2006–2007. The percentage of senior high physics teachers with related educational backgrounds dropped by six percent since 2004–2005.

Chart 15: Junior High Teachers with Related Background 2004–2005 to 2006–2007

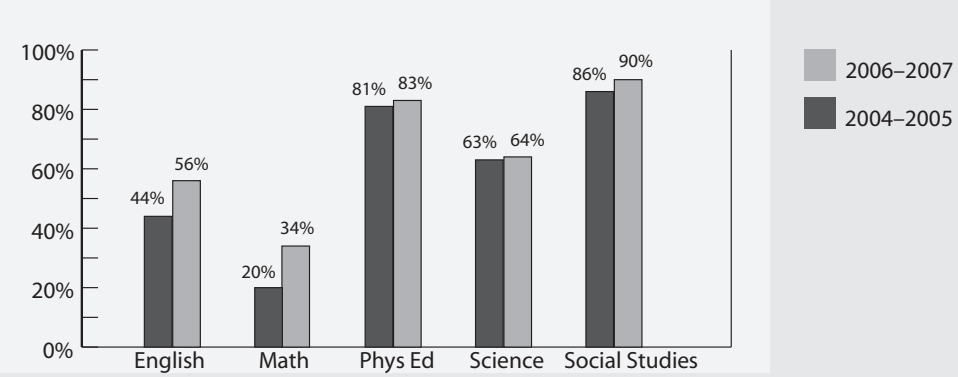
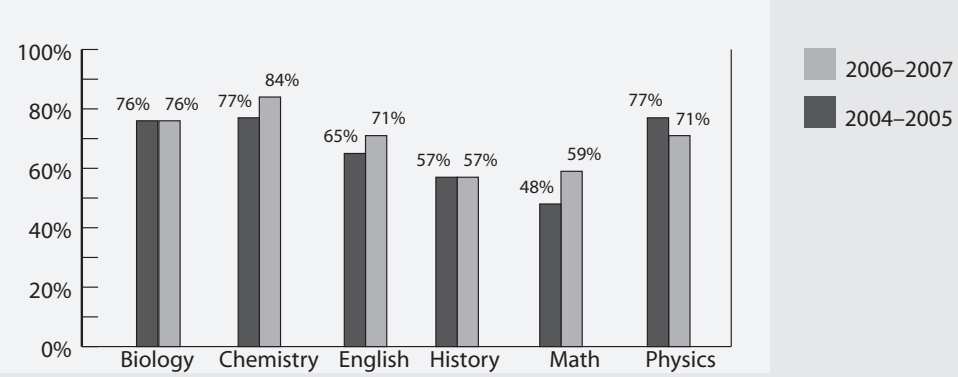


Chart 16: Senior High Teachers with Related Background 2004–2005 to 2006–2007



Erratum: subsequent to original publication correction made to labelling on graph legend. In original version, data year labels were reversed.

It was not possible in this study to conduct additional analysis on those teachers who were undertaking their first year of teaching in 2006–2007, to determine if there have been further improvements in the alignment of post-secondary backgrounds and subjects being taught for new teachers. However, data from the early-hiring job fairs provides some information on the extent to which new hiring efforts are focussed on the subject areas of concern.

Although math has been identified as a critical area with regard to the number of courses that are taught by teachers without a related educational background, data from the early hiring job fairs indicate that not all teachers with an educational background in math are offered positions.

At the most recent early-hiring job fair, school boards interviewed graduating students at four Nova Scotia universities that offer BEd programs through the early-hiring event, which is co-ordinated by the Department of Education. Of 61 applicants with either a first or second teachable in math, only 13 (21 percent) had received an offer as of February 28, 2007. The highest number of offers was for French teachers (both elementary and secondary).

Policy Implications

The data in this study provides information that may be useful in identifying areas in which further work could be undertaken. Several key themes emerged from the analysis that could guide this work.

Subject Areas with Closer Alignment

Several of the subject areas included in the analysis had a significant number of courses taught by teachers with a related background, including physical education (junior high), social studies (junior high), biology (senior high), chemistry (senior high), physics (senior high), and English (senior high).

Subject Areas of Concern

Several subject areas at both the junior and senior high school level had a relatively low percentage of courses taught by teachers with a related educational background. The most significant subject area of concern is math, particularly at the junior high level with only 37 percent of courses taught by a teacher with a related educational background. Junior high English (59 percent) and science
(66 percent) also had relatively fewer courses taught by teachers with related backgrounds.

The analysis of the most common educational backgrounds for junior high teachers who were teaching out of their areas of expertise indicated that most of these teachers have a background in the social sciences and arts disciplines, which raises concern particularly with respect to those who teach math courses. Further examination of the teaching assignment process may provide additional information on the challenges boards may be experiencing with respect to this issue.

Of note, however, is that a significant number of the majors and minors for senior high math teachers who had an unrelated educational background were in biology and chemistry. For the purposes of this study, it was determined that biology and chemistry majors and minors would not generally provide sufficient content knowledge in math. The data suggests that senior high school teachers with expertise in a science discipline tend also to be assigned math courses. Further discussion may be necessary with respect to whether teachers with biology and chemistry degrees have sufficient expertise to teach math at the senior high level.

School boards have recently begun entering into relationships with Nova Scotia universities to provide certificate or graduate programs for current teachers who may need to upgrade their skills with respect to a particular subject area. Several boards have indicated that they currently have cohorts of teachers enrolled in such programs. It is therefore likely that an analysis undertaken in future years would reflect an increase in teacher educational background in that particular subject.

Improvements Since 2004–2005

Since 2004–05, there has been an overall increase in the number of teachers who are teaching in their area of expertise. The degree of improvement varies by course, but is stronger for math and english. Of concern, however, six percent fewer physics teachers had a related educational background in 2006–07, compared to two years previously.

Despite the overall increase in teachers teaching in their area of expertise, data from the early hiring job fairs indicate that there has not been an increase in early offers to students with expertise in the identified areas of concern. Difficulty in recruiting and retaining qualified French teachers has been identified by school boards as a key area of focus for early hiring efforts. Additional efforts may need to be made to increase hiring efforts for qualified math teachers, or to better utilize current teachers with majors or minors in Math who are not teaching in this subject area.

Conclusion

There are a number of subject areas in the Nova Scotia public school program in which most teachers have a related educational background. Some subject areas of concern have also been identified, in which a significant number of courses are being taught by teachers who do not have a related educational background.

The Department of Education will work with its partners to more closely examine these subject areas and the information provided in the above analysis, to identify strategies to address these issues.

Appendix A: List of Related Majors and Minors

Junior and Senior High School Courses

Junior High: Directly Related Majors/Minors and Somewhat Related Majors/Minors

Course	Related Majors and Minors		
	Directly Related Major/Minor	Somewhat Related Major/Minor	
English	English	Classics Drama Latin Library	Linguistics Literacy Theatre
Math	Mathematics	Accounting Business Administration Commerce Computer Science	Economics Engineering Physics
Physical Education	Phyiscal and Health Education Phyiscal Education	Food & Nutrition Health Human Kinetics	Kinesiology Recreation
Science	Agriculture Anthropology Biochemistry Biology Chemistry Earth Sciences Geology Home Economics Kinesiology Microbiology Neuroscience Physics Psychology Science	Environmental Health Environmental Studies Family Studies Food and Nutrition Forestry	Human Ecology Human Kinetics Life Science Nutrition Physical Education Physical and Health Education
Social Studies	Anthropology Atlantic Canada Studies Canadian Studies Classics Community Studies Economics Environmental Studies Forestry Geography Geology History Law Political Science Sociology	Art Business Administration Business Education Commerce Communications Consumer Education English Food & Nutrition French German Health Human Services Information Technology Journalism Latin Linguistics	Literacy Management Marketing Music Philosophy Public Administration Psychology Religion Russian Spanish Sports Administration Technology/Computer Education Theatre Theology Visual Arts

Senior High: Directly Related Majors/Minors and Somewhat Related Majors/Minors

Course	Related Majors and Minors		
	Directly Related Major/Minor	Somewhat Related Major/Minor	
Biology	Agriculture Animal Science Biochemistry Biology Kinesiology Neuroscience Pharmacy Zoology	Chemistry Engineering Environmental Studies Food and Nutrition Health Human Ecology	Oceanography Physical and Health Education Psychology Science Veterinary Medicine
Chemistry	Biochemistry Chemistry Chemical Engineering	Animal Science Biology Engineering Environmental Studies Food and Nutrition	Nursing Oceanography Pharmacy Science
English	English	Classics Drama Journalism Library	Linguistics Literacy Theatre Writing
History	History	Anthropology Canadian Studies Celtic Studies Classics Economics	Geography Law Political Science Sociology
Math	Mathematics	Economics Engineering	Mechanical Engineering Physics
Physics	Chemical Engineering Engineering Mechanical Engineering Meteorology Physics	Biochemistry Chemistry Electronics	Forensic Science Oceanography Mathematics

Appendix B: Overall Results By Subject Area—Detailed Tables

Junior High Subjects						
	# of Courses Taught	# Course Taught by Teachers with			% Course Taught by Teachers with	
		Directly Related Major/Minor	Somewhat Related Major/Minor	Unrelated Major/Minor	Related Major/Minor	Unrelated Major/Minor
English	1286	741	19	526	59.1%	40.9%
Math	1294	399	74	821	36.6%	63.4%
Phys Ed	1223	951	140	132	89.2%	10.8%
Science	1248	682	124	442	64.6%	35.4%
Social Studies	1238	558	553	127	89.7%	10.3%
Total	6289	3331	910	2048	67.4%	32.6%

Senior High Subjects						
	# of Courses Taught	# Course Taught by Teachers with			% Course Taught by Teachers with	
		Directly Related Major/Minor	Somewhat Related Major/Minor	Unrelated Major/Minor	Related Major/Minor	Unrelated Major/Minor
Biology	495	3247	65	103	79.2%	20.8%
Chemistry	365	250	63	52	85.8%	14.2%
English	1584.5	1216.5	11	357	77.5%	22.5%
History	584	306	60	218	62.7%	37.3%
Math	1766	1155.5	27	583.5	67.0%	33.0%
Physics	275	108	99	68	75.3%	24.7%
Total	5069.5	3363	325	1381.5	72.7%	27.3%

Appendix C: Secondary Education Endorsations

Nova Scotia Teacher Certification Standards Education Endorsations	
Recognized Subject Field	**Related Discipline(s)**
1. English	1.1 English
2. French	2.1 French
3. Languages	3.1 Latin 3.2 German 3.3 Spanish 3.4 Gaelic 3.5 Mi'kmaq
4. Social Studies	4.1 History 4.2 Geography 4.3 Political Science 4.4 Sociology 4.5 Economics 4.6 Law 4.7 Classics 4.8 African Canadian Studies 4.9 Mi'kmaq 4.10 Acadian Studies
5. Mathematics	5.1 Mathematics
6. Science	6.1 Biology 6.2 Chemistry 6.3 Physics 6.4 Geology/ Earth Sciences 6.5 Oceanography 6.6 Environmental Studies
7. Physical Education/ Health Education*	7.1 Physical Education
8. Health Education	8.1 Health
9. Fine Arts	9.1 Visual Arts 9.2 Music 9.3 Drama 9.4 Dance 9.5 Theatre Arts
10. Technology Education	10.1 Technology Education 10.2 Computer Science
11. Business Education	11.1 Business Administration 11.2 Commerce 11.3 Marketing 11.4 Accounting 11.5 Finance 11.6 Organizational Behaviour 11.7 Secretarial Arts
12. Family Studies	12.1 Human Ecology 12.2 Home Economics 12.3 Food Science