A Healthy Approach to Classroom Computers: Preventing a Generation of Students From Developing Repetitive Strain Injuries

> I thought that television would be the last great technology that people would go into with their eyes closed. Now you have the computer.—Technology critic Neil Postman[1]

INTRODUCTION

The widespread use of the computer, for all its benefits, has one major drawback: repetitive strain injuries (RSIs).[2] These injuries, which cause pain and nerve damage to the body's upper limbs, result from repeated stresses (such as typing) that are unable to heal properly before re-aggravation occurs.[3] New research indicates that children's computer usage at school exposes them to risk for these debilitating injuries.[4] This phenomenon could result in the impairment of a generation of workers before they even enter the workplace if left untreated. This Comment explores potential ways to minimize children's risks for RSIs, both proactively and retroactively, and analyzes the best means of implementing a solution. This Comment concludes that the preferred solution is a proactive one that incorporates federal guidance and funding but remains flexible enough to allow each state to tailor the solution to meet its unique needs.

1. Todd Oppenheimer, *The Computer Delusion,* ATLANTIC MONTHLY, July 1997, at 62 (quoting Neil Postman at a Harvard electronic-media conference).

2. Scott Fields, *High-Tech Hazards*, ENVTL. HEALTH PERSP., July 1996, at 701 (Sup. Docs. No. HE20.3559:104/7), *available at* http://ehpnet1.niehs.nih.gov/docs/1996/104-7/focus high.html (on file with the North Carolina Law Review); *see infra* note 30 (detailing newspaper accounts of RSIs among adult computer users). RSIs are "tissue injuries caused by the cumulative effects of repetitive physical stress that exceeds physiologic limits." ARMINIUS CASSVAN ET AL., CUMULATIVE TRAUMA DISORDERS 59 (1997).

3. *See* ALISON ARMSTRONG & CHARLES CASEMENT, THE CHILD AND THE MACHINE: HOW COMPUTERS PUT OUR CHILDREN'S EDUCATION AT RISK 144 (2000); DEBORAH QUILTER, THE REPETITIVE STRAIN INJURY RECOVERY BOOK 3 (1998); *infra* notes 29–35 and accompanying text (providing a further discussion of repetitive strain injuries).

4. *See infra* notes 44–49 and accompanying text.

In September 1995, President Clinton unveiled plans for a new initiative that would guarantee "computers in every classroom,"[5] embracing a goal of "technological literacy for every young person in America."[6] According to Clinton, the use of computers would revolutionize American education, ultimately resulting in a scenario in which "children and parents and their teachers will walk into a classroom filled with computers and not even give it a second thought."[7] Clinton's speech marked the beginning of a national campaign for computers in the classroom, a priority shared by corporate America, the general public, and educators.[8]

The campaign for computers in the classroom is not the first example of America's enthusiasm for a new technological advancement as a means to revolutionize public schools. In 1922, Thomas Edison predicted that the motion picture would revolutionize education—potentially replacing textbooks.[9] Some years later, in 1945, educator William Levenson expressed his belief that radios would become as valuable in the classroom as the blackboard.[10] Indeed, some commentators believe our adoption of the computer as the latest technological tool for educational advancement represents a repetition of a pattern—one in which we are obsessed initially with a new innovation, race to implement it at a broad level without fully addressing the costs, and fail to provide an adequate infrastructure to support widespread usage.[11]

Absent conclusive data regarding the effectiveness of computers in revolutionizing education, however, computer usage in public schools has continually increased. In 1997, 69.5 percent of public school students used a computer at school, up more than ten percent

5. Remarks in the Exploratorium in San Francisco, California, 31 WEEKLY COMP. PRES. DOC. 1632 (Sept. 25, 1995).

6. *Id.*

7. *Id*.

8. *See* ARMSTRONG & CASEMENT, *supra* note 3, at 16–18; JANE M. HEALY, FAILURE TO CONNECT: HOW COMPUTERS AFFECT OUR CHILDREN'S MINDS—FOR BETTER AND WORSE 19–20 (1998).

9. LARRY CUBAN, TEACHERS AND MACHINES: THE CLASSROOM USE OF TECHNOLOGY SINCE 1920, at 9 (1986).

10. *Id*. at 19.

11. *See, e.g.*, ARMSTRONG & CASEMENT, *supra* note 3, at 19–22 (chronicling numerous educational technologies over the past one hundred years that failed to meet expectations); CUBAN, *supra* note 9, at 6 (chronicling the patterns of technological use in education throughout the last century); HEALY, *supra* note 8, at 295–96; Oppenheimer, *supra* note 1, at 45 (describing the widespread usage of computers at the cost of other well-established educational programs, such as the arts and physical education).

from 1993.[12] By 1998, U.S. public schools had one computer for every six students, a total of 7.4 million computers.[13] In 1999, students spent approximately nine percent of their day at the computer in the fourth grade, ten percent during the eighth grade, and nineteen percent by the time they reached their final year of high school.[14] The cost of implementing this computer technology is mind-boggling. In the 1997–98 school year alone, schools spent a staggering $2.1 billion on computer hardware.[15] Yet the costs are even greater when viewed in the larger context—schools must be equipped to handle the costs of additional electricity, teacher training, and regular computer support and software updates.[16]

Given the huge sums of money allocated to the use of computers in public schools, many critics, including education, medical, and computer specialists, have voiced their concerns.[17] Their argument boils down to one simple question: if we are spending so much money, shouldn't we at least make sure that computers in the classroom are beneficial—or at the very least not harmful to children?[18]

12. U.S. DEP'T OF EDUC., DIGEST OF EDUCATION STATISTICS 473 (2000) (Sup. Docs. No. ED1.326:999), *available at* http://nces.ed.gov/pubs2000/digest99/chapter7.html (on file with the North Carolina Law Review).

13. ARMSTRONG & CASEMENT, *supra* note 3, at 9. This statistic had increased dramatically within a short period. In 1992, schools housed 3.5 million computers, the equivalent of one computer for every nineteen students. *Id*.

14. Alan Hedge, Ergonomics Programs for Schools: Challenges and Opportunities, *presented at* Children and Information Technology Workshop (June 11–12, 2001), *at* http://ergo.human.cornell.edu/Pub/HFPresentations/JHBW Slides.pdf (on file with North Carolina Law Review). Moreover, because both Republicans and Democrats agree upon computer technology's status as a primary ingredient in revamping America's schools, these figures are likely to increase. *See* Oppenheimer, *supra* note 1, at 45–46 (quoting both President Clinton and former Speaker of the House Newt Gingrich regarding the potential revolutionary effect of using computers in education).

15. ARMSTRONG & CASEMENT, *supra* note 3, at 27. Overall spending on educational technology was expected to reach $6.5 billion in 1998–1999. *Id*.

16. *See, e.g.*, HEALY, *supra* note 8, at 85–88 (describing the hidden costs of computer technology that are often overlooked at the initial stages of implementing the technology).

17. *See generally* ARMSTRONG & CASEMENT, *supra* note 3 (outlining the hidden risks associated with computer usage in educational settings); HEALY, *supra* note 8, at 109–200 (discussing the pros and cons of computers in schools including a detailed analysis of the effects of computer usage on children's overall health and mental development); Oppenheimer, *supra* note 1, at 62 (suggesting that the negative consequences of computer usage in the classroom, while not requiring an end to computer usage, at least support a ban on federal spending pending additional research).

18. *See* ARMSTRONG & CASEMENT, *supra* note 3, at xii ("So far, the most that can be said about computer-based instruction is that vast sums have been lavished on a technology whose educational potential has yet to be proven."); HEALY, *supra* note 8, at 17–22 (noting that computer technology in public schools is costly in terms of monetary

This Comment embraces the critics' concern about children's welfare with regard to increased computer usage in public schools. This Comment does not, however, advocate discontinuing computer usage in public schools, although some critics have suggested that change.[19] Such a position would be both unsuccessful and unwise, given the tremendous popular support for ensuring that our children are technologically equipped to handle the future and the widespread use of computers in society.[20] Rather, this Comment focuses on finding a way to minimize the risk of children developing RSIs from computer usage.

amounts and in developmental time for children, and noting the need for objective analysis and guidelines for children's computer use).

19. *See* ALLIANCE FOR CHILDHOOD, POSITION STATEMENT: CHILDREN AND COMPUTERS: A CALL FOR ACTION, *at* http://www.allianceforchildhood.net/projects/computers/computers_articles_call_for_action.htm (last visited Aug. 8, 2001) (on file with the North Carolina Law Review). In August 2000, the Alliance for Childhood, a group of more than seventy educators, doctors, researchers, students, and technology specialists, called for a "moratorium on the further introduction of computers in early childhood and elementary education." *Id*. at ¶ 6. Citing the lack of conclusive research establishing the computer as a valuable learning tool, the group noted that any marginal benefits were more than outweighed by the physical, emotional, and other developmental hazards posed by the use of computers. *Id*. at ¶ 13. These hazards included repetitive strain injuries, eye strain, social isolation, and obesity, as well as a lack of development of critical emotional and social development skills. *Id*. at ¶ 2 (A number of specialists in the field, including several cited within this Comment, such as Alison Armstrong, Deborah Quilter, and Larry Cuban, signed the report.). *See generally* ALLIANCE FOR CHILDHOOD, FOOLS' GOLD: A CRITICAL LOOK AT COMPUTERS IN CHILDHOOD (Colleen Cordes & Edward Miller eds., 2000), *available at* http://www.allianceforchildhood.net/projects/computers/computers_reports.htm (last visited Aug. 23, 2001) (on file with the North Carolina Law Review) (providing an in-depth analysis of the damages of children's computer usage). Deborah Quilter, an RSI patient, has questioned the usage of computers in schools, apart from the Alliance for Childhood's position. Deborah Quilter, *Letter to the Editor*, WASH. POST, June 6, 1998, at A19 ("Rather than taking a futile approach to prevention, parents should seriously question the value of having computers in schools at all."). According to Quilter, current suggestions for preventing RSIs, such as the use of mini-breaks and the use of ergonomic furniture are not effective, and in fact, lull computer users into a false sense of security. *Id.* Given her perception that computers are "inherently dangerous," Quilter believes that only lifestyle changes, in which the amount of time spent at the computer is kept at a minimum, are truly effective at preventing RSIs. *Id*.

20. *See* ARMSTRONG & CASEMENT, *supra* note 3, at 7–10. The rise of RSIs linked to computer usage may have created the mistaken belief that computers are inherently dangerous. Computers themselves are not the problem; the problem stems from our attitudes and habits regarding how we use them. *See id.* at 11. Computers are a valuable asset if used properly. *See id.* (observing that computers, like any tool, are not neutral in their effects on their users); HEALY, *supra* note 8, at 203–89 (suggesting practical and healthy uses of computer technology for children aged preschool to high school); *Id*. at 292 ("[Computer] [t]echnology does not have to be the killer whale in the pristine pools of humanism, just as it is not the new incarnation of truth.").

Part I describes RSIs generally and briefly discusses how such injuries impact the workplace.[21] Additionally, part I summarizes the current research on children and RSIs, all of which strongly suggests that children are at tremendous risk for developing RSIs.[22] Part II analyzes the potential for legal liability in the form of both negligence and educational malpractice lawsuits, concluding that the likelihood of a successful claim using either approach is slim.[23] Part III details the potential ramifications to those schools that do not take a proactive approach to preventing RSIs, and also addresses the likelihood that the Individuals with Disabilities Education Act (IDEA) will require schools to accommodate the special needs of children with RSIs.[24] This part concludes that a proactive solution is best, given the schools' financial incentive to avoid the costs of accommodating large numbers of children with RSIs, and the national interests in avoiding the crippling effect that these injuries would have on the health care system, and on the future workforce.[25] Part IV explores the elements necessary to establish a proactive solution, namely, education regarding posture and body awareness, and the use of ergonomics.[26] Part V analyzes the best level for implementation of a solution—federal or state, ultimately concluding that a joint effort is needed.[27] The final part points to the Occupational Safety and Health Administration's (OSHA) attempts to deal with RSI injuries in the workplace as essential tools in preventing RSI injuries in the classroom.[28]

I. REPETITIVE STRAIN INJURIES—THE DISEASE OF THE '90S

The increased use of computers in our society has created several negative side effects.[29] The computer revolution has drawn

21. *See infra* notes 29–43 and accompanying text.
22. *See infra* notes 44–49 and accompanying text.
23. *See infra* notes 50–88 and accompanying text.
24. *See infra* notes 89–128 and accompanying text.
25. *See infra* notes 129–33 and accompanying text.
26. *See infra* notes 134–54 and accompanying text.
27. *See infra* notes 155–91 and accompanying text.
28. *See infra* notes 192–224 and accompanying text.
29. Widespread computer usage has been associated with vision problems such as eyestrain and nearsightedness, increased levels of obesity due to lack of physical activity, and decreased socialization. ARMSTRONG & CASEMENT, *supra* note 3, at 56, 150–53; HEALY, *supra* note 8, at 112–22; Oppenheimer, *supra* note 1, at 52 (citing a study claiming that use of a popular reading program caused students to suffer a fifty percent loss in creativity). *But see* Oppenheimer, *supra*, at 53 (citing William Winn, director of the Learning Center at the University of Washington's Human Interface Technology Laboratory, who argues that computers, particularly computer games, have increased

mainstream attention to RSIs—injuries that previously were thought to affect only blue-collar workers.[30] RSIs typically affect the upper limbs, including the nerves, muscles, and tendons of the hand, wrist, arm, neck, and shoulder.[31] Continuous, repeated stresses or awkward

children's imagination); J. Clarke Stevens et al., *The Frequency of Carpal Tunnel Syndrome in Computer Users at a Medical Facility*, 56 NEUROLOGY 1568, 1568, (2001) (concluding that computer users are at no grater risk for carpal tunnel syndrome, a particular kind of RSI, than the general population).

30. Sarah Glazer, *Repetitive Stress Injury: A Modern Malady*, WASH. POST, Mar. 12, 1996, at Z12; Bill D. Hager, *Ergonomic Work Areas Reduce Firms' Injuries*, ORLANDO BUS. J., Feb. 3, 1995, at 37. The advent of computers has created a larger population of people at risk for RSIs. Unlike typewriters, computers allow people to work continuously, thus allowing repetitive motion of the hands at a rate of typing thousands of words an hour. This intense focused work, in combination with other factors such as poor workstation design, poor posture, and few work breaks, makes frequent computer users prime candidates for RSIs. *See* Glazer, *supra*, at Z12; David A. Harvey, *Health and Safety First*, BYTE, Oct. 1991, at 119, 119–22; *see also* Carrie Johnson, *Researchers Study Children's PC Use; Clues to Possible Future Injuries Sought*, WASH. POST, May 16, 2001, at G5 (reporting findings from a recent study by the National Research Council's Institute of Medicine which concluded that computer users with high job stress, who forcefully repeat the same movements when typing, have an elevated risk for musculoskeletal disorders); Sally McGrane, *Creating a Generation of Slouchers*, N.Y. TIMES, Jan. 4, 2001, at G1 (noting the increase of RSIs among adults using computers). Since 1987, the number of reported RSIs has quadrupled, due in large part to increased computer usage. Denis Paul Juge et al., *Cumulative Trauma Disorders: The Disease of the 90's: An Interdisciplinary Analysis*, 55 LA. L. REV. 895, 895 (1995); *see also* Fields, *supra* note 2, at 701 (noting that in the data entry profession, more than fifty percent of workers report RSIs in their wrists or hands); Sally Squires, *Keyboard Countermeasures: There Are Many Devices Aimed at Preventing Repetitive Stress Injury, But What Really Works?*, WASH. POST, Nov. 18, 1997, at Z8 (noting that a 1994 National Institute for Occupational Safety and Health study found that 93,000 people suffered from RSIs related to such activities as typing or key entry, and more than half suffered injury to the wrist.

A recent study by the Mayo Clinic contradicts this previous research. Stevens et al., *supra* note 29, at 1568. The study concluded that computer users are at no greater risk for carpal tunnel syndrome, a particular kind of RSI, than the general population. *Id.* This study, however, appears to have examined only the risk for carpal tunnel syndrome and was done by analyzing a relatively small sample of computer users, 257 employees, in only one place of employment, the Mayo Clinic. *Id.*

31. DEBORAH QUILTER, *supra* note 3, at 3. RSIs are also commonly called cumulative trauma disorders, repetitive stress injuries, occupational cervicobrachial disorders (OCDs), overuse syndrome, work-related disorders, and regional musculoskeletal disorders. MARTHA J. SANDERS, MANAGEMENT OF CUMULATIVE TRAUMA DISORDERS 23 (1997); Glazer, *supra* note 30. This Comment will refer only to RSIs, a name that better describes the injury, particularly because all RSIs are not occupationally related. A number of different RSIs exist, such as de Quervain's disease, trigger finger, gamekeeper's thumb, and tenosynovitis. SANDERS, *supra,* at 25; s*ee also* EMIL PASCARELLI & DEBORAH QUILTER, REPETITIVE STRAIN INJURY: A COMPUTER USER'S GUIDE 49–62 (1994) (providing a detailed description of more than fifteen types of RSIs). The most common type, carpal tunnel syndrome, occurs when the tendons become inflamed and compress the median nerve at the wrist, causing pain, numbness, and tingling of the fingers and hand. DON SELLERS, ZAP!: HOW YOUR COMPUTER CAN HURT YOU—AND WHAT YOU CAN DO ABOUT IT 69, 71 (Steven F. Roth ed., 1994)

movements cause injury to these soft tissue structures, which have insufficient time to heal before re-aggravation occurs.[32] The resulting damage to the area may cause pain, weakness, numbness, or impairment of motor control.[33] Although an RSI may take years to develop,[34] once it occurs, recovery is extremely difficult, and very often requires a change in lifestyle, therapy, or even surgery in extreme cases.[35]

Given the severity of RSIs, it is not surprising that employers began to take notice. In 1999, persons with RSIs missed work an average of seventeen days, as compared with six days for people suffering from all other injuries and illnesses.[36] Further, RSIs cost employers significant amounts of money. Even as early as 1991, U.S. employers spent more than twenty billion dollars annually to cover workers' compensation RSI claims and absenteeism costs.[37] Thus,

(providing a useful description of carpal tunnel syndrome and a helpful diagram of the wrist).

Certain populations are at a greater risk for developing RSIs. For example, women are at a greater risk due to their smaller muscles and bone structure, on average, and hormonal changes resulting from pregnancy or menopause (which can cause swelling). PASCARELLI & QUILTER, *supra,* at 32–34. Overweight people are also at a greater risk, as are people suffering from diabetes, high blood pressure, or kidney disease. *Id.*; *see also* NATIONAL RESEARCH COUNCIL AND INSTITUTE OF MEDICINE, MUSCULOSKELETAL DISORDERS AND THE WORKPLACE: LOW BACK AND UPPER EXTREMETIES, 32, 433 (2001), *available at* http://books.nap.edu/books/030907284/html (noting that physiological differences such as age, weight, and gender can put people at greater risk for RSIs); Laura Royster & Robert Yearout, *A Computer in Every Classroom—Are School Children at Risk for Repetitive Stress Injuries (RSIs)?*, *in* ADVANCES IN OCCUPATIONAL ERGONOMICS & SAFETY 407 (Gene C.H. Lee ed., 1999) (noting that women and those with small wrist or bone structure are at a greater risk for carpal tunnel syndrome, a particular kind of RSI).

32. SANDERS, *supra* note 31, at 23.

33. PASCARELLI & QUILTER, *supra* note 31, at 3, 20–22. Permanent disability could result if left untreated. QUILTER, *supra* note 3, at 9.

34. In adults, the latency period for RSIs can be as long as ten years. McGrane, *supra* note 30.

35. PASCARELLI & QUILTER, *supra* note 31, at 73–82 (noting that treatment of RSIs could involve dietary changes, abstention from the use of computers for a period of time, time off from work, and physical therapy).

36. BUREAU OF LABOR STATISTICS, U.S. DEP'T OF LABOR, LOST-WORKTIME INJURIES AND ILLNESSES: CHARACTERISTICS AND RESULTING TIME AWAY FROM WORK, 1999, at 4 (2001). For carpal tunnel syndrome specifically, the number of missed days jumps to twenty-seven days. *Id.* Illnesses associated with repeated trauma, such as RSIs, were the dominant illness reported in 1999, accounting for sixty-six percent of total illnesses. BUREAU OF LABOR STATISTICS, U.S. DEP'T OF LABOR, WORKPLACE INJURIES AND ILLNESSES SUMMARY 1999, at 2 (2000), *at* http://www.bls.gov/news.release/osh.nr0.htm (last visited on Oct. 13, 2001) (on file with the North Carolina Law Review).

37. Annalee Yassi, *Repetitive Strain Injuries*, LANCET , 943, 943–44 (Mar. 29, 1997). An average RSI claim costs $29,000 in medical care and lost wages. David Heilbroner,

RSIs earned a dubious label: the "#1 occupational hazard of the 1990s."[38] Due to these exorbitant costs, employers have a tremendous incentive to minimize the risk of repetitive strain injuries.[39]

Although prevention of RSIs in the workplace has garnered significant attention, the possibility of a similar problem in public education has failed to attract such attention.[40] Researchers have been unable to study the problem of RSIs in public education adequately because of a lack of funding.[41] Because RSIs have a cumulative effect, most researchers believe that the aggregate harm to children will remain unknown for many years.[42] Moreover, although computer-related injuries in the workplace have cost society significant amounts of money, society has yet to face the costs associated with RSI injuries to children.[43]

The little research that exists, however, suggests that children are even more vulnerable to RSIs. In 1998, a team of Cornell University researchers examined the computer work settings at three New York public school systems. The research team concluded that almost forty percent of the students were at risk of repetitive strain injury due to improper posture.[44] The study also concluded that computer

The Handling of an Epidemic: Repetitive Stress Injury, WORKING WOMAN, Feb. 1993, at 61.

38. *Dramatic Rise in Repetitive Motion Injuries and OSHA's Response: Hearing before the Subcomm. on Employment and Hous. of the House Comm. on Gov't Operations*, 101st Cong. 1 (1989) (opening statement of U.S. Rep. Tom Lantos) (Sup. Doc. Y4.674/7:In 5/3).

39. OSHA Proposed Ergonomics Program, 64 Fed. Reg. 65,767, 65,769 (Nov. 23, 1999). In 1997, employers reported that RSIs resulted in a total of 626,000 lost workdays. *Id.* RSIs make up one-third of the money spent by employers for workers' compensation, costing them a total of fifteen to twenty billion dollars each year. *Id.*

40. The lack of federal research in this area partly stems from the fact that the two leading expert agencies on RSIs, the National Institute of Occupational Safety and Health (NIOSH) and the Labor Department's Occupational Safety and Health Administration (OSHA), only track work-related RSIs, and therefore have not explored the dangers posed to school children. Paul Farhi & Frank Swoboda, *A Computer Made for the 'Barney' Crowd*, WASH. POST, Apr. 24, 1998, at F1.

41. *See* ARMSTRONG & CASEMENT, *supra* note 3, at 159 (noting the dearth of resources available for studying physical effects associated with children's computer usage).

42. *Id.* at 150; *see* Johnson, *supra* note 30; McGrane, *supra* note 30.

43. *See* ARMSTRONG & CASEMENT, *supra* note 3, at 146–151. As Occupational Health and Safety consultant Richard Pilkington commented, "It hasn't been studied yet, because it hasn't cost society any money yet." *Id.* at 159.

44. Shawn Oates et al., *An Anthropometric and Postural Risk Assessment of Children's School Computer Work Environments*, 14 COMPUTERS IN THE SCHOOLS 55, 59 (1998). One less-publicized study reached similar conclusions. *See* Royster & Yearout, *supra* note 31, at 410 (examining 116 students in North Carolina and noting significant

workstations were unadjustable and too large for the students, thus compounding the risk for RSIs.[45] In many schools, the computers are simply placed on ordinary desks, with unadjustable chairs.[46] The tremendous variation in children's size increases the critical impact of this lack of adjustability.[47]

Not surprisingly, medical specialists have noted that computer-related RSI patients are becoming increasingly younger.[48] In 1998, a study of 382 high school students revealed that twenty-eight percent experienced hand discomfort, forty percent experienced neck or back pain, and four percent had been diagnosed with carpal tunnel syndrome as a result of computer use.[49]

postural problems that progressively worsened as the students continued to work at the computer). The Swedish Institute for Working Life has begun a study of children using computers in schools in Japan, Italy, and the United States, but results are not yet available. ARMSTRONG & CASEMENT, *supra* note 3, at 148.

45. Oates et al., *supra* note 44, at 58. Research by another Cornell University group concluded that children's posture improves greatly if the workstation is adjustable. Kathryn L. Laeser et al., *The Effect of Computer Workstation Design on Student Posture*, 31 J. RES. COMPUTERS EDUC. 182–84 (1998). The majority of the workstations in Oates's study failed to meet industry recommended dimensions for monitor height, keyboard height, and seat height. Oates et al., *supra*, at 58.

46. ARMSTRONG & CASEMENT, *supra* note 3, at 147. Armstrong and Casement note that while many women in the workplace are at risk for an RSI because they use office furniture designed for larger people, children are in an even worse position with regard to seat adjustability. *Id.* "Computer workstations are simply not made to fit the size and shape of a child's body." *Id.*

47. *See id.* (providing several examples of the lack of adjustability at school computers, preventing most of the children from using correct posture).

48. *Id.* at 145. Computerization in the schools is likely to increase over the next few years, resulting in children's increased exposure to the computer. *Id*. at 9. RSI-related problems will likely grow in connection with more classroom computer usage. HEALY, *supra* note 8, at 111.

49. Chester S. Jones & Betsy Orr, *Computer-Related Musculoskeletal Pain and Discomfort Among High School Students*, 14 AM. J. HEALTH STUD. 26, 26 (1998). Many young RSI patients are beginning to speak out about the need for preventative education. Paul Linden, *Too Much of a Good Thing: Prevention of Computer-Related Repetitive Strain Injuries Among Children*, T.H.E. J., Aug. 1998, at 26, 26 (quoting a letter from an RSI patient who regrets not having learned proper typing posture at an early age); *see also* Jacqueline L. Salmon, *For Students, Painful Lesson on Computers; More Seek Treatment for Stress Injuries*, WASH. POST, May 17, 1998, at A1 (describing the difficulties of Brendan Connell with an RSI, then a high school student). Connell is one of the signers of The Alliance For Childhood's call for a moratorium on computer usage. *See supra* note 19 and accompanying text (describing The Alliance for Childhood's belief that the benefits of computer usage in schools are outweighed by the physical, emotional, and developmental hazards associated with children's computer use).

II. THE LITIGATION SOLUTION—ANALYZING THE POTENTIAL FOR LEGAL ACTION

Considering that this data may serve as evidence of children's development of computer-related RSIs, schools face the potential for substantial litigation. Public schools should consider modifying their computer practices to reduce potential litigation. Public schools are unlikely, however, to spend money voluntarily on the prevention of RSIs.

The lack of awareness among school administrators of a serious RSI problem is an initial impediment to voluntary action.[50] In 1997, Linda Roberts, President Clinton's head technology adviser in the Department of Education, was asked about the possible ramifications of children's excessive computer use.[51] Roberts opined that neither a minimum age for children to begin using computers, nor a maximum limit to the number of hours children should spend at the computer was necessary.[52] Roberts's attitude reflects those of many administrators who feel that computers have no negative effects and who have adopted the slogan: "the more, the better."[53] Convincing schools of computers' hidden dangers will present a daunting task due to the lack of real evidence that such dangers exist.[54] No absolute data addresses the number of students currently suffering from RSIs.[55] Additionally, as previously mentioned, RSIs may take years to develop,[56] and thus a student may graduate from the school system before any symptoms develop. Moreover, no one can pinpoint accurately which students will develop RSIs later in life because of their habits as students.[57]

50. *See* Oppenheimer, *supra* note 1, at 53; McGrane, *supra* note 30.

51. Oppenheimer, *supra* note 1, at 53.

52. *Id.* Computer curriculum designers may overlook potential dangers involved in computer usage due to their close connection with computer manufactures. *Id.*

53. *See* McGrane, *supra* note 30. Willie Cade, President of Computers for Schools, a nonprofit group that refurbishes used computers for use in public schools, stated that computer workstations that minimize RSIs are often the last thing on school administrators' minds. *Id.* Mr. Cade himself argues that the greatest problem facing public schools is still computer access, not a healthy computer environment. *Id.*

54. *See supra* notes 40–43 and accompanying text.

55. PASCARELLI & QUILTER, *supra* note 31, at 73–82.

56. ARMSTRONG & CASEMENT, *supra* note 3, at 150; *see supra* note 34.

57. Although the risk factors for RSIs, *supra* note 20, are useful in determining future RSI development, they are inconclusive. Some patients who develop RSIs will possess few, if any, of these characteristics. Other people may never develop an RSI even though they meet one or more of the risk criteria. *See* PASCARELLI & QUILTER, *supra* note 31, at 22–23; Juge et al., *supra* note 30, at 896.

Absent awareness of the problem and substantial statistical evidence, schools have little incentive to work proactively to minimize the development of RSIs. Such a solution would entail an immediate cost[58] and a long-term benefit that would be extremely difficult to measure.[59] Another impediment to voluntary change is that schools may never determine conclusively whether protections they implement actually would reduce the number of students who developed an RSI later in life.[60] Additionally, as the rate of computer usage at home increases, schools will have an even more difficult time measuring the success of any proactive steps.[61]

Even the threat of a negligence lawsuit is unlikely to provide a sufficient incentive for school systems to make any adjustments with their computer usage policies and procedures. Although two possible grounds for a lawsuit exist, negligence[62] and educational malpractice,[63] as explained below, an injured student's prospects for success in either type of suit seem dubious.[64] In fact, no student has asserted either claim against a school district, board, or teacher for injuries caused by an RSI in any reported case.

58. One of the greatest obstacles hindering the discovery of a workable solution is the belief that changes to the current curriculum and computer workstation arrangement would be extremely expensive, thus diverting money from the purchase of computer equipment. Julie Sturgeon, *Bits, Bytes, and Backaches*, SCH. PLAN. & MGMT., Nov. 1, 1999, at 40. *But see infra* notes 152–53 and accompanying text (revealing that some solutions are relatively inexpensive).

59. A proactive solution may require costly measures such as purchasing new computer equipment, revamping the curriculum, and training computer educators. *See infra* notes 137–51 and accompanying text. If these measures prove successful, fewer children would develop RSIs later in life, but the exact number of students that these proactive remedies help could never be determined because of time and measurement inadequacies.

60. This is due to the time delay in RSI development and the lack of concrete information about the percentage of students who currently suffer from RSIs. *See* QUILTER, *supra* note 3, at 7–8. This problem is compounded by the fact that most students are involved in a number of other repetitive activities, such as playing a musical instrument, sports, or video games. Royster & Yearout, *supra* note 31, at 409.

61. ARMSTRONG & CASEMENT, *supra* note 3, at 8 (noting that over fifty percent of U.S. households now own computers, as compared with approximately one-third in 1995); Lini S. Kadaba, *Young Students Suffering from Repetitive-Strain Injuries*, KNIGHT-RIDDER/TRIBUNE NEWS SERVICE, Feb. 9, 2001, at K3175 (noting the difficulties in pinpointing the cause of RSIs among children).

62. *See infra* notes 65–77 and accompanying text.

63. *See infra* notes 78–88 and accompanying text; *see, e.g.,* Moss Rehab. v. White, 692 A.2d 902, 905 (Del. 1997) (identifying lawsuit against driving school on the basis of negligent instruction as an education malpractice claim).

64. *See infra* note 88 and accompanying text.

Students face a hurdle in order to establish a negligence claim, namely causation.[65] Although the student may be able to establish that the school negligently failed to provide proper equipment and frequent breaks, or emphasize proper posture adequately,[66] the student will have a more difficult time linking this negligent action to an RSI. Even assuming the court examines the merits in good faith, any number of intervening causes could require the court to conclude that the plaintiff failed to show causation in fact. As previously mentioned, because RSIs are the product of cumulative stress to the affected area,[67] symptoms may not appear until years later.[68] This lengthy "dormancy" period increases the chances that a student's other repetitive activities could have caused the RSI.[69] Most students are involved in more than one activity, ranging from playing a musical instrument, to playing a sport that involves repetitive motion, to playing video games.[70] For these students, it is virtually impossible to

65. *See generally*, Hagen v. Texaco Refining and Marketing, Inc., 526 N.W.2d 531, 537 (Iowa 1995) (holding that the requirements of cause-in-fact and legal causation (proximate cause) are met upon a showing "that a defendant's conduct was a substantial factor in producing the damages and the damages would not have occurred except for the defendant's conduct").

66. Even here, a school system could easily claim that it had little reason to suspect that children were at risk for RSIs. The current lack of empirical studies would support such a claim. Given the tremendous amount of attention placed on RSIs in the workplace environment, the lack of information regarding RSIs and children to date could allow the school to claim they (and indeed a reasonably prudent person) were unaware of the dangers of RSIs to children.

67. SANDERS, *supra* note 31, at 23.

68. ARMSTRONG & CASEMENT, *supra* note 3, at 144; McGrane, *supra* note 30; *see also supra* note 34 and accompanying text.

69. QUILTER, *supra* note 3, at 6–7.

70. *See* Royster & Yearout, *supra* note 31, at 409. In a sample of 116 students, seventeen percent reported that they regularly played a musical instrument in an ensemble, twenty-five percent play solo, fifty percent played a sport (such as tennis or basketball), and seventy-five percent reported playing video games regularly. *See* ARMSTRONG & CASEMENT, *supra* note 3, at 149 (describing "Sega thumb," an RSI caused by video games); ARMINIUS CASSVAN ET AL., CUMULATIVE TRAUMA DISORDERS, 119–31 (1997) (describing common RSIs found among athletes); *Id*. at 133–42 (providing descriptions of various RSIs prevalent among musicians); Kadaba, *supra* note 61 (noting the difficulties in determining whether children's RSI pain stems from computers or some other activity such as music or sports); T.H.H. Guan Koh, *Ulcerative "Nintendinitis": A New Kind of Repetitive Strain Injury*, 173 MED. J. AUST. 671, 671 (2000) (describing an RSI caused by playing Nintendo, and noting that the customer information booklet for Nintendo 64 carries a warning of the risks of RSI associated with the game system); Joseph F. Slade III et al., *Wrist and Hand Injuries in Musicians: Management and Prevention,* 16 J. MUSCULOSKELETAL MED. 542, 542 (1999) (observing that piano players and string players are the musicians at greatest risk for RSIs in the hand and wrist).

determine which activity actually caused the injury;[71] indeed, a combination of activities could have caused the injury.[72]

Even absent evidence that the student was involved in other repetitive activities that could have caused an injury, the lengthy "dormancy" period for RSIs may still make it difficult to establish proximate causation. By the time most students experience the symptoms of the illness, they have already left the school system, and often have entered the workplace.[73] Generally, courts are unwilling to find proximate causation when a prolonged amount of time elapses, because the period between the alleged negligence and the alleged resultant injury increases the chance that intervening factors caused the injury.[74]

For example, a student who asserts a negligence claim against a school system because its improper furniture caused the student's RSI has little chance of success as the student may be unable to prove causation. In most schools, children use the computer a few hours a day, in some cases only a few hours each week.[75] Thus, the school system easily can argue that the student who sued the school for her

71. In such cases, the student would have to sue persons responsible for the development of the RSI—a tennis instructor, a piano teacher, a computer instructor, his school, etc.—jointly and severally, proving that the defendant did not minimize the risk for RSIs. From a practical standpoint, such an option does not seem feasible. The student probably could not prove which parties were responsible for the RSI, and thus the student could not recover.

72. For example, a child may regularly play the piano, use the computer at home and at school, and play video games during the period before developing RSI symptoms. That child's RSI may not be the result of any one of the activities, but rather the result of all of the activities. *See* Kadaba, *supra* note 61, at K3175.

73. *See* ARMSTRONG & CASEMENT, *supra* note 3, at 144; McGrane, *supra* note 30, at G1 (quoting Dr. Alan Hedge, a design and environmental analysis professor at Cornell University, acknowledging a three to five year latency period for the development of RSIs in children). A student who actually experiences the symptoms of an RSI while still in secondary school may provide an exception to the causation problem. The student will still face an uphill battle, however, in asserting the prima facie elements of a negligence claim. *See infra* notes 71–74 and accompanying text.

74. PROSSER & KEETON, THE LAW OF TORTS § 43 (5th ed. 1984). Although in the past, the statute of limitations would have also presented another obstacle in RSI cases, many modern courts have adopted the discovery rule, which prevents the statute of limitations from running until all elements of negligence are present and the plaintiff discovers, or reasonably should have discovered her injury. DAN B. DOBBS, THE LAW OF TORTS § 217–18 (2000).

75. Oates et al., *supra* note 44, at 62 (asserting that children currently do not spend large amounts of time at the computer); Royster & Yearout, *supra* note 31, at 411 (revealing that a survey of educators and school administrators identified 3.75 hours per week as the ideal time for students to spend on computers). Armstrong and Casement note that "[i]t is not unusal for grade school children to plug into their machines for two or more hours a day" because many students use computers whenever it seems efficient. ARMSTRONG & CASEMENT, *supra* note 3, at 17.

RSI did not use a computer at school long enough to sustain any injury.[76] This argument would be even stronger if the student's involvement in other repetitive activities could have caused the RSI.[77]

A possible solution to the causation problem may lie in the way the student asserts the negligence claim. Rather than attack computer usage or improper furniture in the school, a student should focus the negligence claim on the patterns and behavior regarding computer usage in the school. Thus, a student could assert that the school or school system was negligent in failing to emphasize adequately the dangers of poor posture, lack of frequent breaks, and overuse, leaving him completely unaware that such activity placed him at risk for developing an RSI until it was too late. The school's negligence fostered bad lifelong habits, making every life activity contribute to his RSI. This argument would eliminate the problem of proximate causation due to the delay in RSI development because the student would now assert that the school caused him to create lifetime habits. Also, the argument would remove any intervening cause argument because the student applied behavior that he learned at school to the other repetitive activities in which he was involved.

Such an assertion in a negligence action follows similar reasoning to another potential claim against schools: educational malpractice.[78] Although courts consistently have disallowed many educational malpractice claims,[79] citing public policy concerns[80] or problems with

76. *But see* PASCARELLI & QUILTER, *supra* note 31, at 40 (arguing that as little as two to four hours a day at a computer is enough to put a person at risk).

77. *See supra* notes 69–72 and accompanying text; Kadaba, *supra* note 61, at K3175 (citing statement by Karen Jacobs, President of the American Occupational Therapy Organization, concerning the difficulty of determining whether a child's RSI comes from "computers or heavy book bags or piano lessons or aggressive sports").

78. Educational malpractice is a particular type of negligence suit based upon improper or inadequate educational instruction. W. PROSSER & W. KEETON, THE LAW OF TORTS 1048 (5th ed. 1984); *see also* Moss Rehab. v. White, 692 A.2d 902, 905 (Del. 1997) (identifying lawsuit against drawing school alleging that negligent instructor caused accident as an educational malpractice claim). Educational malpractice claims typically fall into one of two types: (1) concerns over inadequate educational programs; or (2) negligent diagnosis, classification, or placement of students in special education programs. Sharon E. Brown & Kim Cannon, *Educational Malpractice Actions: A Remedy for What Ails Our Schools?* 78 EDUC. L. REP. 643, 644 (1993); John G. Culhane, *Reinvigorating Educational Malpractice Claims: A Representational Focus*, 67 WASH. L. REV. 349, 351 (1992).

79. Brown & Cannon, *supra* note 78, at 643; Culhane, *supra* note 78, at 349.

80. *See, e.g.*, D.S.W. v. Fairbanks N. Star Borough Sch. Dist., 628 P.2d 554, 557 (Ala. 1981) (stating that the plaintiff's claim for negligent classification of dyslexia was better suited for administrative, not judicial, review); Peter W. v. S.F. Unified Sch. Dist., 60 Cal. App. 3d 814, 825 (1976) (citing concerns of a flood of lawsuits against the schools as well as significant expenditures of time and money that could be better spent by the schools);

proximate causation,[81] within the last ten years, education scholars increasingly have turned to the educational malpractice claim as a potential means of correcting perceived problems in the public school system, thus holding teachers accountable for their instruction or lack thereof.[82]

Despite the fact that the argument has yet to be successful in court, at least two courts have recognized the possibility of such an educational malpractice claim.[83] These courts acknowledged that

Vogel v. Maimonides Acad. of W. Conn., Inc., 754 A.2d 824, 827 (Conn. App. Ct. 2000) (stating that the court was unwilling to assume the difficult task of defining what constitutes a "reasonable educational program"); Donohue v. Copiague Union Free Sch. Dist. 391 N.E.2d 1352, 1354 (N.Y. 1979) (declining to interfere with day-to-day school administration).

81. *See, e.g.*, *Peter W.*, 60 Cal. App. 3d at 824 (noting that a number of factors beyond the formal teaching process influence school achievement); Tolman v. CenCor Career Colls., Inc., 851 P.2d 203, 205 (Colo. Ct. App. 1992), *aff'd,* 868 P.2d 396 (Colo. Ct. 1994) (observing that academic success is largely dependent on the student and is greatly affected by the student's attitude and abilities, making it impossible to establish proximate cause to any claimed injuries); Helm v. Prof. Children's Sch., 431 N.Y.S.2d 246, 246–47 (N.Y. Sup. Ct. 1980) (stating that a student's attitude, motivation, temperament, past experience and home environment all have an essential effect on learning).

82. NATHAN L. ESSEX, SCHOOL LAW AND THE PUBLIC SCHOOLS: A PRACTICAL GUIDE FOR EDUCATIONAL LEADERS 122–25 (1999) (noting that the recent trends of teacher empowerment, school-based management, and national teaching and certification standards have eliminated many of the courts' prior policy concerns regarding educational malpractice claims); Brown & Cannon, *supra* note 78, at 657 (advocating the allowance of all educational malpractice claims as a means of improving school standards nationwide); Culhane, *supra* note 78, at 349 ("[A] wastebasket approach to claims of educational injury is unjustified, and should be abandoned."); Katherine Lush, *Expanding the Rights of Children in Public Schools*, 26 NEW ENG. J. ON CRIM. & CIV. CONFINEMENT 95, 112–115 (2000) (identifying educational malpractice as a way to ensure that students receive a solid education); Cheryl L. Wade, *Educators Who Drive With No Hands: The Application of Analytical Concepts of Corporate Law in Certain Cases of Educational Malpractice*, 32 SAN DIEGO L. REV. 437, 445 (1995) (arguing for the allowance of educational malpractice only in cases concerning gross negligence in misclassification of special education students).

83. In the unpublished educational malpractice claim presented in *Yakubek v. Rex*, No. 91-3541, 963 F.2d 374 (6th Cir. May 15, 1992) (per curiam), the U.S. Court of Appeals for the Sixth Circuit reversed the district court's dismissal for failure to state a claim. The lower court's reasoning was grounded in *Poe v. Hamilton*, 565 N.E.2d 887 (Ohio 1990), a case it interpreted to deny all educational malpractice claims on policy grounds. *Yakubek*, 963 F.2d at 374. The court of appeals, however, disagreed, finding that *Poe v. Hamilton* does not exclude all educational malpractice claims. *Id.* Nevertheless, the court cautioned that its reversal did not evaluate the merits of the claim before it, but merely afforded the plaintiffs an opportunity to present the merits of their claim. *Id.*

Likewise, the court in *Donohue v. Copiague Union Free School District.*, 391 N.E.2d 1352 (N.Y. 1979), while refusing to allow a claim for educational malpractice for policy reasons, acknowledged that the claim could be pleaded successfully under a traditional negligence analysis. *Id.* at 1353–54. In *Donahue*, the plaintiff sued the school district alleging a deficiency in his education due to the school allowing him to graduate without rudimentary reading skills. *Id.* The court noted that the educators, if viewed as

professional educators could bear a legal duty of care similar to that already imposed on doctors, lawyers, architects, and engineers.[84] The possibility of an educational malpractice claim could exist only if an appropriate standard is developed to judge an educator's performance of that duty.[85] All of the attempted educational malpractice claims involved a departure from a recognized norm, or reasonableness standard, causing the plaintiff's injuries.[86] A student with an RSI may be able to use a similar approach and claim that the student's school system or teacher failed to act as reasonable educational professionals act regarding instruction that emphasized the prevention of RSIs.

Even if courts allow educational malpractice claims generally, RSI educational malpractice claims may still prove unsuccessful. Few educators recognize the need for appropriate computer instruction (or lack thereof) emphasizing posture and frequent breaks as a means

professionals according to a judicially derived standard, could have a duty of care to their students. *Id.* at 1354. Even though the court noted proximate cause may be more difficult to prove, the court acknowledged "it perhaps assumes too much to conclude that it could never be established." *Id*.

The *Donahue* court's acknowledgement of an educator's duty of care mirrors the views of a number of commentators who believe that the basic elements of a negligence claim should be used in crafting an educational malpractice claim. Culhane, *supra* note 78, at 354; Lush, *supra* note 82, at 114; *see also* note 81 and accompanying text.

84. *Yakubek*, No. 91-3541, 963 F.2d at 374; *Donohue*, 391 N.E.2d at 1353.

85. *Donohue*, 391 N.E.2d at 1353. The argument that educators should be held to a professional standard of care has increasingly gained popularity. ESSEX, *supra* note 82, at 122–23 (citing the trend for national teaching standards already embraced by educators); Culhane, *supra* note 78, at 373–74 (arguing that teachers can and should be held to defined standards); Wade, *supra* note 82, at 453 (noting that holding doctors, engineers, attorneys, architects, and accountants liable for malpractice has a powerful deterrent effect). Teacher accountability is a major premise of President Bush's education plan, "No Child Left Behind," and is a central part to the pending education bill in the House and the Senate. COMM. ON EDUC. AND THE WORKFORCE, SUMMARY OF H.R. 1: NO CHILD LEFT BEHIND, *available at* http://edworkforce.house.gov/issues/107th/education/nclb/hr1sum.htm (last visited Oct. 12, 2001) (on file with the North Carolina Law Review) [hereinafter NO CHILD LEFT BEHIND].

86. *See, e.g.*, *Peter W.,* 60 Cal. App. 3d at 818 (involving a plaintiff who unsuccessfully claimed that his school wrongly allowed him to graduate without basic reading skills, in violation of the state's education code); Denver Parents Ass'n v. Denver Bd. of Educ., 10 P.3d 662, 663–64 (Colo. Ct. App. 2000) (involving parents who unsuccessfully claimed that the school board failed to adhere to curriculum standards and other statutory requirements); Hoffman v. Bd. of Educ., 400 N.E.2d 317, 380 (N.Y. 1979) (denying an educational malpractice claim based on misdiagnosis of mental retardation, resulting from the use of a widely accepted diagnostic test); *see also* Culhane, *supra* note 78, at 381 ("The focus [of an educational malpractice claim] should . . . be whether there has been a slip between the chosen policy and its implementation . . . .").

to prevent RSIs.[87] RSI prevention would not be considered an aspect of the professional standard.[88]

Lawsuits against schools alleging either negligence or educational malpractice will be difficult to maintain. Therefore, even if one suit were to prevail, school systems as a whole probably would not be threatened. The variance in state law and the difficulty in establishing a successful claim make the possibility of widespread change as a result of lawsuits highly improbable. Ultimately, schools are not likely to work proactively to minimize the risk for RSIs based on the threat of lawsuits alone.

III. THE RETROACTIVE SOLUTION—CONSEQUENCES OF A "WAIT AND SEE" APPROACH

Because the threat of litigation is so tenuous and the cost of special accommodations for each RSI-diagnosed student is so high, schools may be willing to "wait and see" if liability ensues. If the medical community's assertion that more and more children will develop RSIs at an earlier age proves correct,[89] this phenomenon could become costly to both the schools and the children. Schools which fail to implement RSI prevention programs will nonetheless have to deal with students who have already developed RSIs.[90]

The 1994 Individuals with Disabilities Education Act (IDEA) may force schools to provide special accommodations for students with RSIs, and thereby prevent them from taking the "wait and see" approach.[91] The IDEA aims to provide free appropriate public

87. *See infra* notes 139–47, 153–54 and accompanying text.

88. DOBBS, *supra* note 74, at § 117. Even assuming educators can be held to a professional standard of care due to their specialized knowledge or skill, *see supra* notes 86–88, no professional standard of care exists regarding RSI prevention from which educators could depart. *See* DOBBS, *supra* note 74, at § 122.

89. *See supra* notes 41–49 and accompanying text.

90. The American Chiropractic Association (ACA) reports about 44,000 ergonomic injury cases in children under the age of sixteen, half of which are caused by computer use. Dennis McCafferty, *Position Kids for Computer Success*, USA WEEKEND, July 30, 2000, at 14. The ACA believes that "chronic hand, wrist, back, neck and shoulder pain" (RSIs) will increase by fifteen percent in children under the age of sixteen over the next five years. *Id.*

91. 20 U.S.C. §§ 1400–1487 (1994); *see also* Bd. of Educ. v. Rowley, 458 U.S. 176, 191 (1982) (providing the IDEA's legislative history). The IDEA is the sole remedy available to a disabled child and his parents asserting a right to free appropriate public education. Smith v. Robinson, 468 U.S. 992, 1009 (1984), *superseded by statute on other grounds*, 20 U.S.C. § 1415(f) (1994); *see also* Glen III v. Charlotte-Mecklenburg Sch. Bd. of Educ., 903 F. Supp. 918, 936 (W.D.N.C. 1995) (holding that the IDEA is the exclusive avenue for disabled students, and rejecting plaintiff's attempt to circumvent stricter administrative remedies by invoking the ADA).

education to meet the unique needs of children with disabilities so that they are prepared for employment and independent living,[92] ensuring the rights of these children and their parents.[93] Assuming the IDEA protects students with RSIs, schools will be required to meet these students' special needs.[94]

The IDEA requires the creation of an individualized education program (IEP) specifically tailored to the needs of each disabled student.[95] An IEP should include the student's present educational level and goals, any "special education and related services and supplementary aids and services"[96] needed to reach those goals, and the extent to which the student can participate in regular educational curricula.[97] A school or school system may be civilly liable for failure to provide the necessary aids and services.[98]

The IDEA defines a child with a disability broadly to include a child with a "health impairment" or "orthopedic impairment" who "by reason thereof, needs special education and related services."[99] Although no student with an RSI has ever brought a case under the IDEA, analogies can be drawn to cases involving students with other orthopedic impairments. For example, in *Yankton School District v.*

92. 20 U.S.C. § 1400(d)(1)(A) (1994); *Rowley*, 458 U.S. at 191 (stating that the purpose of the IDEA is to prevent disabled students from being "either totally excluded from schools or . . . sitting idly in regular classrooms awaiting time when they were old enough to drop out"); Smith v. Indianapolis Pub. Sch., 916 F. Supp. 872, 875 (S.D. Ind. 1995) (confirming the stated congressional purpose behind the IDEA).

93. 20 U.S.C. § 1400(d)(1)(B) (1994); Mrs. A. J. v. Special Sch. Dist. No. 1, 478 F. Supp. 418, 431 (D. Minn. 1979).

94. *See Rowley*, 458 U.S. at 206 (emphasizing the need for strict adherence to the IDEA's requirements).

95. 20 U.S.C. §§ 1401(11), 1414(d) (1994 & Supp. V 1999). The IEP provides an individualized curriculum for the disabled student, and must be reviewed annually with parents and teachers to reassess the student's needs. 20 U.S.C. § 1414(d) (1994 & Supp. V 1999); 34 C.F.R. § 300.343(c) (2000); ESSEX, *supra* note 82, at 75–76 (describing the requirements of an IEP); Stephen C. Shannon, Note, *The Individuals With Disability Education Act: Determining "Appropriate Relief" in a Post-Gwinette Era*, 85 VA. L. REV. 853, 855–56 (1999) (providing an overview of what the IDEA requires). Parents who are dissatisfied with the proposed IEP may seek review by the state or intermediate educational agency. Shannon, *supra*, at 856.

96. 20 U.S.C. § 1414(d)(1)(A) (1994 & Supp. V 1999).

97. *Id.* The school must re-evaluate each child with a disability at least every three years. *Id.* at § 1414(a)(2).

98. While public schools may enjoy immunity from suit, section 1403 of the IDEA eliminates this immunity in the case of disabled students. 20 U.S.C. § 1403(a) (1994); *see also* Peter v. Johnson, 958 F. Supp. 1383, 1394 (D. Minn. 1997) (upholding a challenge to the constitutionality of this section), *rev'd on other grounds sub nom.* Peter v. Wedl, 155 F.3d 992 (1998).

99. 20 U.S.C. § 1401(3)(A) (Supp. V 1999).

Schramm,[100] the student suffered from an orthopedic impairment caused by cerebral palsy and experienced weak hand strength, stiffness in her right hand, and lack of dexterity, all of which forced her to write and type slowly.[101] This disability required "special education and related services,"[102] such as shortened, modified assignments and copies of her teachers' notes.[103] The school district informed the student that the accommodations currently provided to her under the IDEA would be discontinued because the school no longer considered her eligible for special services.[104] The school district reasoned that the student's excellent grades meant her impairment did not impact her academic education; thus, because her orthopedic impairment did not "adversely affect" her educational performance, the provisions of the IDEA were unavailable.[105] In interpreting the statutory definition of orthopedic impairment, the court noted that the regulation does not clarify what qualifies as an adverse effect on educational performance.[106] The court found that the student's inability to take notes or complete assignments without additional assistance would adversely affect her educational performance.[107] As a result, the court concluded that the student was still eligible for special services under the IDEA.[108]

Similar to the student in *Schramm*, a student with an RSI may also experience weakness in hand strength, clumsiness, and a lack of dexterity.[109] The RSI would make writing or using the computer for long periods of time difficult, and in severe cases, impossible.[110]

100. 93 F.3d 1369 (8th Cir. 1996).

101. *Id.* at 1371.

102. 20 U.S.C. § 1401(a)(3)(A)(ii) (1994).

103. *Schramm*, 93 F.3d at 1371.

104. *Id.* at 1374–75. The school district contended that the student's impairment affected only her physical education performance. Because the student had already completed her requirement for physical education, the school district argued that she was no longer eligible for IDEA accommodations. *Id*.

105. *See* 34 C.F.R. § 300.7(c)(8) (2000) (requiring that an orthopedic impairment must adversely affect educational performance to fall within the IDEA); *Schramm*, 93 F.3d at 1374–75.

106. *Id.* at 1375.

107. *Id.* at 1375–76.

108. *Id*. at 1377.

109. *See supra* notes 31–33 and accompanying text; PASCARELLI & QUILTER, *supra* note 31, at 3. Because overuse of computers is often a cause of RSIs, *see* Harvey, *supra* note 30, at 119, the continued use of computers after development of RSIs only aggravates the injury. *See* SANDERS, *supra* note 31, at 23.

110. *See* text accompanying *supra* note 104. The common problems associated with RSIs, such as constant fatigue, pain, numbness, weakness in the hands or forearms, lack of coordination, clumsiness, and difficulty opening and closing the hands (to hold a pencil, for example), would be greatly aggravated in test situations, or even in regular

Consequently, a student suffering from an RSI may not be able to complete her assignments and exams on time, or may be otherwise distracted by the chronic symptoms of the disorder. Absent any special accommodations from the student's teachers, the RSI easily could have an adverse effect on the student's academic performance. If the *Schramm* court is correct regarding the definition of an orthopedic impairment as one that adversely affects educational performance, a student with an RSI would be protected under the IDEA because an RSI meets this definition.[111]

Even if the argument for inclusion under the IDEA on the ground of an orthopedic impairment fails, a student with an RSI may still receive legal protection. The IDEA also provides a catch-all provision for disabilities, such that an individual suffering from any "other health impairment" requiring "special education and related services" would qualify.[112] Any "other health impairment" is defined as a lack of strength or alertness because of chronic or acute diseases or disorders that have an adverse effect on the child's academic performance.[113] RSIs are chronic disorders causing weakness in the hand and wrist area,[114] and making writing and computer use both difficult and painful for students.[115] Arguably, RSIs fall within the definition of "other health impairment."[116] Inclusion in the catch-all

assignments. PASCARELLI & QUILTER, *supra* note 31, at 3, 20–22. In severe RSI cases, permanent nerve damage may occur, resulting in the loss of function in the hands. SELLERS, *supra* note 31, at 71 (discussing injuries associated with carpel tunnel syndrome, one form of RSI).

111. The IDEA fails to provide a workable definition of "orthopedic impairment." 20 U.S.C. § 1401(3)(A) (Supp. V 1999). Webster's Dictionary, however, defines "orthopedic" to include "injuries of the bones and joints." WEBSTER'S NEW WORLD DICTIONARY OF THE AMERICAN LANGUAGE 1035 (David B. Guralnik & Joseph H. Friend eds., 1966). If a court adopted Webster's definition of "orthopedic," RSIs arguably would fall under the IDEA's umbrella of protection.

112. 20 U.S.C. § 1401(3)(A) (Supp. V 1999).

113. 34 C.F.R. § 300.7(a)(9) (2000). The regulations explain that other health impairments are those due to chronic health problems such as "asthma, attention deficit disorder or attention deficit hyperactivity disorder, diabetes, epilepsy, a heart condition, hemophilia, lead poisoning, leukemia, nephritis, rheumatic fever, and sickle cell anemia." *Id*.

114. PASCARELLI & QUILTER, *supra* note 31, at 3, 20–22.

115. *See supra* notes 109–110 and accompanying text.

116. *See* Babicz v. Sch. Bd. of Broward County, 135 F.3d 1420, 1422 (11th Cir. 1998) (noting that allergies, migraines, and sinusitis are health impairments protected under the IDEA). RSIs, which are more severe than these impairments, should also be protected. *See supra* notes 31–35 and accompanying text (describing the symptoms of RSIs, including pain, numbness, loss of motor control, and permanent disability (if left untreated)).

provision's coverage would require accommodations to ensure that a student with an RSI received a free appropriate education.[117]

The accommodations that the IDEA necessitates may require schools to give students with RSIs additional time to complete in-class assignments or exams, or to shorten their assignments.[118] In addition, the school may be required to provide alternative means for orthopedic-impaired students such as those with RSIs to take notes and prepare assignments.[119] Such alternatives might include providing note-takers[120] or allowing students to tape classes[121] to facilitate studying. Alternatively, as the necessary technology develops, schools may be required to invest in voice-recognition software[122] so students suffering from RSIs can continue to work at a computer without aggravating their existing RSIs.[123]

117. *See supra* note 92–93 and accompanying text.

118. *See* Yankton Sch. Dist. v. Schramm, 93 F.3d 1369, 1371 (8th Cir. 1996).

119. *See id.*

120. *See, e.g.*, Salmon, *supra* note 49 (describing a young RSI patient whose high school provided him with a note-taker to accommodate his injury).

121. *See* Schramm, 93 F.3d at 1371.

122. *See Salmon*, *supra* note 49, at A1 (describing high schools and colleges that have provided voice-recognition software enabling students with severe RSI cases to orally input text into their computers). Waiting to purchase the software until the technology has improved may be preferred. *See, e.g.*, Joshua Quittner, *The Little Dictator: A Digital Device Can Translate Your Voice into Type—But First You Have to Learn How to Talk to It*, TIME, Feb. 1, 1999, at 69, 69 (noting that the user of a voice-recognition device must provide a lengthy example of himself speaking, as much as twenty minutes); G. David Wallace, *It Rights It Wrong*, BUS. WK., Apr. 21, 1997, at 23, 23 (noting that the accuracy problem is greater with lower-cost software packages).

123. All of the accommodations listed above have their own strengths and weaknesses requiring a case-by-case analysis of what is needed for each student with an RSI. For example, providing a note-taker may not be the most cost-efficient accommodation—a note-taker is not needed for every minute of the school day, yet because of the difficulties in determining exactly when she is needed, she would presumably get paid for some time during which she did not take notes—but may be the most appropriate for visual learners. Tape recording classes, while more cost efficient, may not be as effective for later studying, particularly if the RSI student is a visual rather than an audio learner. Likewise, voice-recognition software would not be useful during an exam unless the student was isolated from other students taking the exam. Even in non-exam settings, voice recognition software might be distracting for other students and prevent them from working effectively.

The cost of these accommodations, both in terms of time and money, also should be considered, as the costs will only increase as more students develop RSIs. For example, hiring one note-taker at minimum wage for six hours a day (assuming a seven-hour school day with one hour for lunch and situations in which a note-taker would not be needed, such as during physical education) for 180 days, the approximate length of a school year, would cost a school $5,670 annually based on a minimum wage of $5.25 per hour. Similarly, the current cost of voice-recognition software is also expensive. Wallace, *supra* note 122, at 23 (accurate programs can cost hundreds of dollars). Within the last few

Although the IDEA provides for federal funding to enable the accommodation of disabled students, the funding comes in the form of competitive grants.[124] States receive a total package of funding from these grants, which they must disseminate among local educational agencies.[125] Moreover, the amount of funding is not earmarked according to a particular disability, but is disseminated in a lump sum.[126] Thus, RSIs must compete with other disabilities for federal funding.[127] States may not be able to cover RSIs with the federal funds, forcing them to bear some of the administrative and implementation costs on their own. States may also face additional expense in the form of lawsuits because the IDEA provides a private action against the school if the school fails to ensure full educational opportunity for a disabled student protected by the IDEA.[128]

Therefore, the costs of accommodating students with RSIs under the IDEA may provide the necessary incentive for schools to work proactively to minimize risk.[129] An additional incentive may be the school's desire to avoid the negative publicity of lawsuits, albeit unsuccessful ones. The federal government has the greatest financial incentive to work proactively.[130] As the number of children with RSIs

years, several companies have created low-cost voice-recognition software; however, accuracy is a tremendous problem. *Id.*

124. *See* 20 U.S.C. § 1411(a) (1994 & Supp. V 1999). The amount of funding each state may receive is subject to a number of restrictions, including a maximum amount (no more than forty percent of the average per-pupil expenditure multiplied by the number of children within the state who qualify under the IDEA). *Id.* To qualify for federal assistance, states must meet a number of requirements. For example, they must provide "free appropriate public education" to children with disabilities, establish a goal of providing these children with full educational opportunity, identify all disabled children and develop an IEP for each disabled child, and attempt to mainstream disabled children as much as possible. 20 U.S.C. § 1412 (1994 & Supp. V 1999).

125. 20 U.S.C § 1411(g) (1994 & Supp. V 1999). Local school systems must also meet a number of federal requirements, as outlined in § 1413.

126. *See* 20 U.S.C. § 1411 (a)(2), (f)(3) (1994 & Supp. V 1999).

127. *See* ESSEX, *supra* note 82, at 72. The IDEA prioritizes funding to children with disabilities not receiving any type of education, and then to children with the most severe disabilities. *Id*.

128. 20 U.S.C. § 1403 (1994 & Supp. V 1999); *see also* Peter v. Johnson, 958 F. Supp. 1383, 1392–93 (D. Minn. 1997) (upholding a challenge to the constitutionality of this section), *rev'd on other grounds, sub nom.* Peter v. Wedl, 155 F.3d 992 (1998).

129. Although compensatory and punitive damages are not available under the IDEA, *see* Sellers by Sellers v. Sch. Board of City of Manassass, 141 F.3d 524, 527 (4th Cir. 1998), injunctive relief is available to compel a school to provide necessary accommodations to a disabled student. *See* Yankton Sch. District v. Schramm, 93 F.2d 1369, 1376 (8th Cir. 1996) (compelling school to accommodate disabled student). In addition, attorney's fees are also available to the prevailing plaintiff. *Schramm*, 93 F.3d at 1377.

130. The role of the federal government in finding a solution is explored more fully in Part V of this Comment. *See infra* notes 155–91 and accompanying text.

continues to increase, the federal government may have to increase the funding provided to the states under the IDEA. This increase in funding will need to be dramatic if analysts are correct in their predictions that the next generation of students will be plagued by RSIs.[131] Because the problem will continue long after these students graduate, the development of RSIs among children will have a tremendous impact on both the future of America's workforce[132] and our health care system. A proactive solution will ultimately be more cost effective than the "wait and see" approach.[133]

IV. WORKING TOWARDS A PROACTIVE SOLUTION–ESSENTIAL ELEMENTS

Any solution to the problem of RSIs must involve two key elements: (1) use of ergonomic[134] furniture and (2) education of educators, teachers, students, and parents, both in terms of proper posture and body awareness in the curriculum and with regard to the problem of RSIs in general.[135] The first component, ergonomic

131. *See supra* notes 41–43 and accompanying text.

132. *See supra* notes 36–39 and accompanying text (describing the current problems plaguing the workplace due to adult RSIs).

133. *See supra* note 89 and accompanying text; *infra* notes 188–89 and accompanying text.

134. Ergonomics is the study of man and work. It is premised on the concept of tailoring tools and equipment so that the user can work comfortably. *See* OSHA Proposed Ergonomics Rule, 64 Fed. Reg. 65,768, 66,075 (Nov. 23, 1999) ("Ergonomics is the science of fitting jobs to people."). A central component to ergonomic design is that the computer workstation should be adjustable to allow users of varying size to comfortably operate the equipment. ARMSTRONG & CASEMENT, *supra* note 3, at 146–48. The elements of computer workstations, such as the monitor, keyboard, and chair, should all meet recommended height and placement dimensions. *See, e.g.*, SELLERS, *supra* note 31, at 64–65. While the recommended dimensions vary slightly, the American National Standards Institute, in conjunction with the Human Factors Society, has issued a set of guidelines widely followed in the workplace. AM. NAT'L STANDARDS INST., AMERICAN NATIONAL STANDARD FOR HUMAN FACTORS ENGINEERING OF VISUAL DISPLAY TERMINAL WORKSTATIONS 11–62 (1988). Other accessories may be helpful in minimizing the risk of injury. *See* PASCARELLI & QUILTER, *supra* note 31, at 169 (advocating the use of wrist rests when the user is not actively typing); *id*. at 171 (advocating the use of copyholders, which are stands that elevate books and papers to prevent the user from having to look down to read); QUILTER, *supra* note 3, at 151 (noting that split keyboards align the hand and the forearm in a more neutral position).

135. Employers have relied on ergonomic furniture and education to minimize risks of RSIs. *See* NAT'L INST. FOR OCCUPATIONAL SAFETY & HEALTH, U.S. DEP'T OF HEALTH AND HUMAN SERVS., PROPOSED NATIONAL STRATEGIES FOR THE PREVENTION OF LEADING WORK-RELATED DISEASES AND INJURIES: MUSCULOSKELETAL INJURIES 8 (1997). Following the workplace's approach, leading authorities on children and computer injuries have targeted these elements as necessary. *See* HEALY, *supra* note 8, at 117 (emphasizing posture, awareness, and workstation design); Laeser et al., *supra* note 45, at 183 (observing the link between poor computer

furniture, is essential to a successful solution because it is a necessary condition for proper posture.[136] Currently, most schoolchildren use machines and furniture designed for adults.[137] Even if teachers have emphasized the need for correct posture during computer usage, children face difficulty following these instructions because the furniture is too large for them. Adult-sized furniture causes children

workstation design, poor posture, and RSIs in both adults and children); Deborah Quilter, *Computer Injuries: The Next Generation,* VDT NEWS (1995), *at* http://www.rsihelp.com/vdt.shtml (last modified Mar. 15, 1999) (on file with the North Carolina Law Review); *see also* ARMSTRONG & CASEMENT, *supra* note 3, at 144 (noting that computer-related RSIs are caused by a combination of postural problems, faulty techniques, poorly designed workstations, and infrequent breaks).

136. *See* Laeser et al., *supra* note 45, at 183 (noting that research in adult office workers established that workstation design can promote unhealthy posture and risk of musculoskeletal injury, and concluding that the same is true of children who use improperly designed computer workstations); Oates et al., *supra* note 44, at 56 ("Poor posture while working at the computer results from poor workstation design . . . .").

137. *See* ARMSTRONG & CASEMENT, *supra* note 3, at 147–48. (stating that computer workstations are not made to fit children). To date, few manufacturers have developed computer equipment designed specifically for children. *Id.* at 146. ("[T]here has been little interest in designing a computer keyboard, VDT, chair, or table for the health and safety of children."). One exception is a company called Kidstation, which deals exclusively in ergonomically designed computer equipment designed to provide correct support and grow along with the child. Connie Koenenn, *Tapping Into the Needs of Computer-Age Kids*, L.A. TIMES, June 18, 2000, at E2. For $199, Kidstation offers an adjustable desktop (allowing heights of twelve to twenty-two inches), with several positions for a monitor shelf. *Id.* The company also manufactures an adjustable chair, as well as a scaled-down mouse and keyboard to accommodate smaller hands more comfortably. *Id.* Similarly, IBM and Little Tikes Co. have combined their efforts to offer a computer molded into a child-sized desk, targeted at three to seven year old users. Farhi & Swoboda, *supra* note 40, at F1. Dubbed the "Young Explorer," the computer system is available for $2,399. *Id.* Such a computer system may be too expensive for most school systems.

The lack of awareness of RSIs among children results in a small market for such innovations. ARMSTRONG & CASEMENT, *supra* note 3, at 158. Armstrong and Casement discuss one educator who has developed a proposal for building better workstations for children but has been unable to find a company who will manufacture it. *Id.* (citing Janetta A. Wilson, *Computer Laboratory Workstation Dimensions: Scaling Down for Elementary School Children,* 8 COMPUTERS IN THE SCHS., 1991, at 41–48). A school in Toronto also tried to work with a furniture company to produce a more child-friendly workstation but was unsuccessful. *Id.* Consequently, some schools have taken matters into their own hands. A school in Los Angeles is gaining national attention for its use of computer tables designed for younger users. *Id.* The tables were designed by a technical teacher at the school and cost six hundred dollars to build. *Id.* Currently, only two companies make such furniture, and most schools cannot afford it. Additionally, most schools do not realize they need adjustable, age appropriate equipment, because they have not recognized the problem of RSIs among school children. *See supra* note 50–53 and accompanying text.

to contort themselves in order to use the machines, thus increasing the chances that an RSI will develop.[138]

Although purchasing child-sized ergonomic furniture is a necessary first step, it is not sufficient to prevent RSIs. Education is also needed, both in terms of specific ways to reduce RSIs and raising awareness of RSIs in general. Schools' curricula must place additional emphasis on posture and body awareness. Achieving the ideal computer postural arrangement, according to most occupational therapists, requires the monitor to be positioned slightly lower than eye level (to minimize eyestrain), with the chair adjusted so that the user's "knees are at the same level or slightly lower than the hips."[139] The user's forearms should be level with the keyboard, and the wrists should remain as closely aligned with the elbow as possible, with the forearm parallel to the floor.[140] Before working at the computer, stretching exercises are also useful.[141] In addition, the user should take frequent and regular breaks, before experiencing symptoms of pain and fatigue.[142] Finally, computer users should stop working at the first sign of pain, discomfort, or fatigue.[143] Most students, however, are not concerned with their posture at the computer because they are more focused on accomplishing the task at hand.[144] As one can see, the problem will persist without educational programs supplementing ergonomic furniture use.

138. ARMSTRONG & CASEMENT, *supra* note 3, at 147 ("A desk that is too high, for example, forces the elevation of the shoulders and causes muscle fatigue and pain across the shoulders and base of the neck."). Lack of adjustability for the tremendous variance in children's sizes exacerbates the problem. *Id*.

139. *Employee Health: Building the Perfect Work Station*, SAN DIEGO BUS. J., Oct. 5, 1998, at 20, *available at* http://www.yankton.net/stories/071198/lif_building.html (on file with the North Carolina Law Review) [hereinafter *Employee Health*]; *see Beyond Carpal Tunnel: Avoiding RSI Pitfalls*, LONG ISLAND BUS. NEWS, Sept. 10, 1999, at 2B.

140. *See Employee Health*, *supra* note 139, at 20 (discussing tips for the prevention of RSIs). *See generally* PASCARELLI & QUILTER, *supra* note 31, at 177–80 (describing proper posture while working on a computer).

141. Linden, *supra* note 49, at 30. Linden recommends a twenty-minute stretching exercise to "prepare the body for computer work" regardless of the length of time the individual will use the computer. *Id.* Pascarelli and Quilter recommend stretching throughout computer use, including shoulder rolls, forearm, neck and shoulder exercises. PASCARELLI & QUILTER, *supra* note 31, at 98.

142. Linden, *supra* note 49, at 30 (recommending a brief, five-second break every ten minutes, and a five to ten minute break away from the computer every hour). Special screensaver software applications are available that remind users to take regular breaks and to check their posture. *See Employee Health, supra* note 139, at 20.

143. *See Beyond Carpal Tunnel*, *supra* note 139.

144. *See* ARMSTRONG & CASEMENT, *supra* note 3, at 145 (noting that children often display worse posture at computers than adults and stressing the need for education regarding posture and frequent breaks).

Proper education is not only crucial to the immediate prevention of RSIs, but also to prevention of injuries over a lifetime. Posture is particularly significant for children because they are developing life-long habits.[145] Children must increase their level of body awareness—to recognize when their bodies are being stressed, and to focus on relaxation, balance, and movement efficiency.[146] Otherwise, children become so engaged in computer usage that they ignore pain and cause even greater damage.[147]

Training people to have proper posture and body position as well as to use ergonomic furniture is necessary to prevent RSIs. Social education regarding RSIs in general, however, is also a critical component of a solution. Social awareness remains a giant obstacle, evidenced by the lack of research regarding children and RSIs.[148] Top-level education administrators still believe that setting a maximum number of hours that children should spend at a computer per day is unnecessary.[149] Social education must extend throughout all levels of administration, and must especially be made known to teachers, many of whom have not considered the risks.[150] Still, if the ultimate goal is to minimize the total incidence of RSIs, parents must

145. *See* Quilter, *supra* note 135 (noting that computer users adapt to the shape of their furniture). Quilter notes that "[p]oor posture is extremely difficult to correct later in life." *Id.* Thus, she believes that "[c]hildren should learn proper technique from the moment they first sit down at a computer." *Id*.

146. Linden, *supra* note 49, at 26.

147. *See* Royster & Yearout, *supra* note 31, at 409 (finding that sixty-seven percent of students self-reported that when they experienced pain while using the computer they continued working instead of stopping for a break); *see also* HEALY, *supra* note 8, at 111 (noting that children are not always aware of pain and that the adverse health effects are cumulative).

148. *See supra* notes 40–43 and accompanying text.

149. Oppenheimer, *supra* note 1, at 53 (recounting a conversation with President Clinton's then-lead technology adviser in the Department of Education, Linda Roberts).

150. In conducting research, I spoke with many teachers, several of whom were designated as their school's "technology specialists." Overwhelmingly, while the computer teachers were aware of the general dangers of computer use in adults, most had never considered the possibility of injuries such as RSIs occurring in children. *See* Royster & Yearout, *supra* note 31. With this outlook, teachers may fail to take advantage of risk minimizers already available to them. For example, an article in the *New York Times* reported that even though a school computer lab had been equipped with adjustable chairs, the computer instructor had never thought about adjusting them, even for toddlers. Jane Gross, *Missing Lesson in Computer Class: Avoiding Injury*, N.Y. TIMES, Mar. 15, 1999, at A1. In the school district that Ms. Gross examined, the technology director exhibited the same lack of awareness. *See id.* (quoting the technology director as stating that "[i]t never dawned on me"). Although the district's teachers received training in computer software packages, none were educated regarding ergonomic practices that could easily prevent RSIs. *See id.*

also recognize the dangers, so that they can more closely monitor their child's computer usage at home.[151]

Social education must also convince school systems that the cost of a solution is not necessarily onerous. Economical alternative solutions to purchasing expensive ergonomic furniture exist. In Palo Alto, California, for example, teachers use removable foam pads to elevate smaller children to the appropriate height, and reiterate a simple motto to remind students to pay attention to their posture: "[s]it up straight. Keyboard to the edge of the table. Mouse next door."[152] Likewise, in Boston suburbs, occupational therapist Karen Jacobs teaches children lessons in healthy computing—emphasizing the need to stretch, take frequent breaks, and adjust the workstations to fit their needs, using everyday items such as dictionaries to sit on, and backpacks as foot rests.[153] Regardless of the chosen solution, the expense of providing such changes pales in comparison to the cost of treatment for RSIs.[154]

V. DETERMINING THE MOST APPROPRIATE LEVEL OF IMPLEMENTATION

Although the basic components of a solution may be readily identified, determining the best level of government (federal or state) for implementation is not as simple. Traditionally, public education has been predominately a state function, with the federal government

151. *Id.* Gross provides the example of one parent, an occupational therapist, who offered to provide free consultations to other parents on how to modify home workstations to better meet the needs of their children. No parent, however, accepted her offer. *Id.* According to the occupational therapist, "[p]arents are more concerned with how fast they can get on the Internet, [and] whether they have the right math games." *Id.*

152. *Cyber Skills* (NBC Nightly News television broadcast, Mar. 22, 1997) (transcript on file with the North Carolina Law Review).

153. Gross, *supra* note 150; *see also* PASCARELLI & QUILTER, *supra* note 31, at 172 (recommending the use of rolled-up towels to support the lower back, as well as other "home remedies"); Wayne Parker, *Not All Ergonomic Solutions are Pricey*, PAC. BUS. NEWS, Sept. 25, 1995, at 32 (mentioning numerous low-cost measures to prevent RSIs "such as the use of old telephone books for footrests and readjusting chair height and monitor position"). Interestingly, parents specializing in the prevention of RSIs instituted both the California and Massachusetts programs. Gross, *supra* note 150; *Cyber Skills*, *supra* note 152, suggesting that parents who are aware of the problem and are willing to work to find solutions can successfully lobby schools for change.

154. *See* Parker, *supra* note 153. The workplace has already acknowledged the cost-effectiveness of prevention rather than dealing with RSIs retroactively. *Id.* (quoting the corporate safety coordinator for Hawaiian Airlines as stating, "In the long run, you end up saving money.").

playing a limited role.[155] Each state, therefore, has developed its own curriculum content and instructional methods.[156] Presumably, this assignment of responsibility to the states reflects the belief that state and local governments are more aware of the specific needs of their schools and students than the national government.[157]

Not surprisingly, each state's attention to technology use in education varies greatly. In 1998, *Education Week* conducted a

155. CENTER ON EDUCATION POLICY, A BRIEF HISTORY OF THE FEDERAL ROLE IN EDUCATION: WHY IT BEGAN AND WHY IT'S STILL NEEDED 4, *at* http://www.ctredpol.org/pubs/Brief_History_Federal_Rule_Education.pdf (last visited Aug. 23, 2000) (on file with the North Carolina Law Review); H.C. HUDGINS, JR. & RICHARD S. VACA, LAW AND EDUCATION: CONTEMPORARY ISSUES AND COURT DECISIONS 6 (1995); *see* Richard W. Riley, *The Role of Federal Government in Education—Supporting a National Desire for Support for State and Local Education*, 17 ST. LOUIS U. PUBL. L. REV. 29, 32–42 (1997) (discussing former Secretary of Education Richard Riley's account of the historical as well as the current role of the federal government in education). Federal funding supplies approximately seven percent of schools' needs. CENTER ON EDUCATION POLICY, *supra*, at 4. Moreover, because most elementary and secondary education funding is derived from local property taxes and state income taxes, the deductions allowed on federal income taxes for these items operate as an indirect subsidy, encouraging bond referenda and other local financing activities. *Id*. at 6–7.

156. CENTER ON EDUCATION POLICY, *supra* note 160, at 4; HUDGINS & VACA, *supra* note 155, at 6 (citing the Tenth Amendment as giving each state the direct responsibility for creating a public school system). *But see* Riley, *supra* note 155, at 31–32, 36 (discussing Congress's power to appropriate funds, "as well as the corollary power to place conditions on the receipt of federal funds . . . for education"). As Riley notes, the debate over federal involvement in education can be traced to two constitutional provisions that conflict with each other to a degree. *Id*. at 31–32. While the Tenth Amendment reserves powers not given to the United States to the states, Article I, Section 8 of the Constitution authorizes Congress to "provide . . . for the general welfare of the United States," which many have interpreted to include overseeing education. *See id.* It is well settled, however, that the general welfare clause does not give the federal government power to control educational curriculum. *Id*. at 36 ("[T]his power is not a power to exercise Federal control over educational curriculum."). The Department of Education Organization Act, Pub. L. No. 96-088 § 103(b), 93 Stat. 668, 670 (1979) (codified at 20 U.S.C. § 3403(b)), specifically prohibits the Department of Education from controlling local curricula, unless specifically authorized by law. Wheeler v. Barrera, 417 U.S. 402, 416 (1974), modified on other grounds, 422 U.S. 1004 (1975) (noting the legislative history behind the Federal Non-interference with Curriculum Statute, 20 U.S.C. § 1232a, revealed by Congress's clear intent to leave curriculum matters to local and state agencies); Griggs v. Cook, 272 F. Supp. 163, 169 (N.D. Ga. 1967) (noting that matters of curriculum are normally left to local law); Grimes By and Through Grimes v. Cavazos, 786 F. Supp. 1184, 1188 (S.D.N.Y. 1992) (noting that the federal government is precluded from interfering in the "day-to-day operation" of schools), *overruled on other grounds*, 832 F. Supp. 704 (1993).

157. *See* Michael Heise, *1994 GOALS 2000: Educate America Act: The Federaliation and Legalization of Educational Policy*, 63 FORDHAM L. REV. 345, 360–61 (1994) (noting that familiarity with educational conditions "decreases exponentially" when one moves from the classroom and local communities toward the federal government).

national survey of the technological curriculum in each state.[158] Results of the survey indicated that the current technology programs in a number of states could be modified easily to include a focus on the prevention of RSIs.[159] Several states had already created graduation standards for students or requirements exclusively pertaining to technology and computer literacy.[160] These standards could be revised to include strategies for minimizing the development of RSIs, as well as general education concerning the dangers of RSIs.[161] Moreover, four states presently require teachers to participate in technology training as part of renewing their licenses[162]—providing an excellent opportunity to educate teachers on

158. Mary Ann Zehr, *The State of the States*, EDUC. WK., Oct. 1, 1998, *at* http://www.edweek.org/sreports/tc98/st/st-n.htm (last visited on Oct. 15, 2001) (on file with the North Carolina Law Review).

159. *Id.*

160. *See id*. at 77–110. According to the survey, North Carolina is the most advanced in requiring students to demonstrate technology skills because of the state's mandatory technology competency test. *Id.* at 71; *see also* N.C. DEP'T OF PUB. INSTRUCTION, COMPUTER/TECHNOLOGY SKILLS CURRICULUM, *at* http://www.dpi.state.nc.ud/curriculum/computer.skills/index.html (last visited Aug. 23, 2001) (describing North Carolina's technology curriculum) (on file with the North Carolina Law Review). Other states that have requirements regarding technology and computer literacy are Alaska, Arizona, Connecticut, Maryland, Michigan, North Dakota, Oklahoma, Utah, and Wisconsin. *See* ALASKA DEP'T OF EDUC. & EARLY DEV., ALASKA STANDARDS: CONTENT AND PERFORMANCE STANDARDS FOR ALASKA STUDENTS, 39–40, *at* http://www.eed.state.ak.us/qschools/StandardsBook.pdf (last visited Aug. 23, 2001) (on file with the North Carolina Law Review); ARIZ. DEP'T OF EDUC., TECHNOLOGY EDUCATION STANDARDS, *at* http://www.ade.state.az.us/standards/technology/default.asp (last visited Aug. 23, 2001) (on file with the North Carolina Law Review); CONN. STATE DEP'T EDUC., PREKINDERGARTEN THROUGH GRADE 12 COMPUTER TECHNOLOGY COMPETENCY STANDARDS FOR STUDENTS, *at* http://www.state.ct.us/sde/dsi/technology/StudentComp.pdf (last visited Aug. 23, 2001) (on file with the North Carolina Law Review); MBRT COMMITTEE ON TECHNOLOGY IN EDUCATION, STATE OF INNOVATION: THE MARYLAND PLAN FOR TECHNOLOGY IN EDUCATION 1999–2003 (1998) (on file with the North Carolina Law Review); MICH. DEP'T EDUC., OVERVIEW OF TECHNOLOGY CONTENT STANDARDS, *at* http://cdp.mde.state.mi.us/mcf/contentstandards/technology/default (last visited Aug. 23, 2001) (on file with the North Carolina Law Review); OKLA. STATE DEP'T OF EDUC., PRIORITY ACADEMIC STUDENT SKILLS, *at* http://sde.state.ok.us/publ/pass.html (last visited Aug. 23, 2001) (on file with the North Carolina Law Review); UTAH STATE BD. OF EDUC., ELEMENTARY AND SECONDARY CORE CURRICULUM STANDARDS: EDUCATIONAL TECHNOLOGY, *at* http://www.usoe.k12.ut.us/curr/EdTech/newcore.htm (last visited Aug. 23, 2001) (on file with the North Carolina Law Review); WIS. DEP'T OF PUB. EDUC., WISCONSIN MODEL ACADEMIC STANDARDS FOR INFORMATION & TECHNOLOGY LITERACY, *at* www.dpi.state.wi.us/dltcl/imt/pdf/infotech.pdf (last visited Aug. 23, 2001) (on file with the North Carolina Law Review). North Dakota is also creating technology and computer literacy standards and expects to complete the process by 2002. The new standards will be available at http://www.dpi.state.nd.us/standard/content.shtm.

161. *See supra* notes 139–51 and accompanying text.

RSIs. In addition, forty-two states provide funding specifically earmarked for technology,[163] a portion of which could be used to purchase ergonomically correct furniture.[164] Thus, because many states have been successful in installing technology in schools, the prevention of RSIs among children may seem best suited for state-level implementation. The individuals most aware of the school systems' needs, therefore, would be allowed to implement change.[165]

Yet, because each state is free to design its own curriculum and educational agenda, no uniform standard would exist.[166] As a result, children in one state may be at little risk for RSIs due to that state's attention to the problem, whereas children in the neighboring state may be at a much higher risk. Successful implementation at the state level, therefore, would require all fifty states to recognize the need for restructuring the computer curriculum voluntarily,[167] a result that could take years to accomplish fully.

First, because uniformity is preferable, federal implementation should also be considered.[168] Federal involvement in the prevention of RSIs has several advantages. The federal government could help

162. Zehr, *supra* note 158, at 75, 91, 93 (California, Connecticut, New Hampshire and North Carolina). Most of the remaining states offer optional technology training. *See id*. at 72–101.

163. *Id*. at 72–101. The amount of funding varies, from $500,000 in Vermont, to $230 million in California. *Id*. at 74, 98.

164. *See supra* note 137 (detailing currently available ergonomic furniture specifically designed for children).

165. *See* Heise, *supra* note 162, at 360–61 (arguing that local officials, who are closer to schools and communities, are more aware of the schools' educational needs).

166. *See* HUDGINS & VACA, *supra* note 155, at 6; *see also supra* notes 155–56 and accompanying text (discussing public education as a traditional state function).

167. The problem is exacerbated by the fact that states are responsible for about ninety-three percent of funding for education and are already facing difficult decisions as to how to best allocate that funding. *See* CENTER ON EDUCATION POLICY, *supra* note 155, at 4.

168. Although the federal government has traditionally played a very limited role in public education, within the last fifty years, federal involvement in education has increased. *See supra* notes 160–61 and accompanying text; CENTER ON EDUCATION POLICY, *supra* note 155, at 4, 7–9; *see also* U.S. DEP'T OF EDUC., DIGEST OF EDUCATION STATISTICS 1999, at 395–427 (2000) (Sup. Docs. No. ED1.326:999), *available at* http://nces.ed.gov/pubs2000/digest99/chapter4.html (reporting an increase in federal funding for education since 1965) (last visited on Nov. 11, 2001) (on file with the North Carolina Law Review). In 1983, education became a national issue following the release of *A Nation at Risk*, a federal report outlining numerous problems leading to the declining performance in U.S. public schools. CENTER ON EDUCATION POLICY, *supra*, at 7; Riley, *supra* note 155, at 41; *see also* NATIONAL COMMISSION ON EXCELLENCE IN EDUCATION, A NATION AT RISK: THE IMPERATIVE FOR EDUCATIONAL REFORM 5 (1983) (noting that "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people").

by: (1) acting as a clearinghouse of ideas;[169] (2) targeting federal funds to improve computer education by including information on RSIs;[170] (3) preparing students to excel in a technologically advanced workplace without increasing their chance of injury;[171] and (4) acting as a national catalyst to prevent the development of RSIs among children.[172]

Because the problem of children and RSIs requires research and investment beyond what state and local governments can afford,[173] the federal government could act as a clearinghouse of information aimed at finding a solution. It is simply infeasible and inefficient for each state and local government to research independently the best means of preventing RSIs among children.

First, the federal government should institute a federal program to provide national assistance in the form of communicating the latest strategies, research, and innovations designed to minimize the risk of RSIs among children.[174] As discussed below, state participation in the federal program would be voluntary.[175]

Second, the federal government should provide financial support to local schools so that computer instruction will include RSI prevention techniques and so that the schools can meet the specific needs of students with RSIs.[176] In the past, the U.S. Department of Education has provided almost $15.4 billion in the form of specific grants and funds for educational improvements in elementary and secondary schools.[177] Although RSI prevention programs may be

169. *See* Riley, *supra* note 155, at 36–37 (discussing the federal government's current role as a clearinghouse of ideas); *infra* note 173–75 and accompanying text.

170. *See* Riley, *supra* note 155, at 37–38 (discussing the current use of targeted federal funds for education); *infra* text accompanying notes 176–78.

171. *See* Riley, *supra* note 155, at 38–39 (discussing the federal government's role in preparing "young people to succeed in college careers"); *infra* notes 179–82 and accompanying text.

172. *See* Riley, *supra* note 155, at 36–42 (discussing the Federal Government's role as a catalyst for improving education); *infra* notes 183–89 and accompanying text.

173. *See* Riley, *supra* note 155, at 36–37. For example, the Educational Resources Information Center (ERIC) is a vast clearinghouse for innovative strategies for improving the quality of public education. *Id.* The ERIC also provides access to the most current research in education. *See id.* ERIC could be updated to include strategies and research on the prevention of RSIs among schoolchildren.

174. A federal program has the advantage of providing a uniform, baseline approach. Although states may need minor adjustments to customize any program to meet their particular needs, this approach is more preferable than allowing each state to design their own program, resulting in fifty potentially vastly different solution.

175. *See infra* note 215 and accompanying text.

176. *See* Riley, *supra* note 155, at 37–38.

177. *Id.* at 37.

costly,[178] the federal government can reduce the burden on the states by providing funds for the purchase of ergonomic furniture, teacher training in RSI prevention, and accommodations for any students already suffering from RSIs.

Third, the federal government could prepare young people for a technologically advanced workplace without increasing their likelihood for future injury.[179] Legislation has focused national attention on the importance of equipping students with technical skills to create productive members of the future workplace.[180] This legislation should include provisions for educating students not only about how to use existing technologies, but how to use them *safely*. Otherwise, students who develop RSIs early in life will be restricted in the work they choose, and unable to contribute to society in a productive manner.[181] Indeed, society may end up bearing the costs of treating these injuries.[182]

Finally, the federal government should aid in finding a solution because RSIs already pose a national problem. The federal government must provide national leadership and act as a catalyst for change.[183] Over the past fifty years, the federal government has

178. *See infra* note 208, 218 and accompanying text. *Compare supra* notes 152–53 and accompanying text (discussing economic solutions), *with supra* note 137 (discussing expensive computer furniture made for children's usage).

179. *See* Riley, *supra* note 155, at 38.

180. *See id*. Two pieces of legislation are worthy of mention here, the School-to-Work Opportunities Act of 1994, Pub. L. No. 103-239, 108 Stat. 568 (codified as amended at 20 U.S.C. §§ 6101–6251 (1994 & Supp. V 1999)), and the Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (codified as amended in scattered sections of 15 U.S.C., 18 U.S.C. and 47 U.S.C.). The School-to-Work Opportunities Act promotes the development of the future workforce through partnerships among schools, businesses, and community leaders with the use of federal funds. Riley, *supra* note 155, at 38. The Telecommunications Act contains the Education Rate (E-rate), a program designed to provide equal access to telecommunications in the schools and integrate technology more fully into education. *Id*. at 38.

181. *See supra* note 31–35 and accompanying text (describing RSI symptoms and noting that permanent disability can result if an RSI is not treated correctly).

182. *See* OSHA Proposed Ergonomics Rule, 64 Fed. Reg. 65,767, 65,769 (Nov. 23, 1999) (discussing the need for ergonomic standards).

183. Riley, *supra* note 155, at 41 (noting that the need for national leadership has been an increasing public demand since the 1980s). Three recent presidents have made education top priorities, and have specifically included plans for improving school technology. President George H.W. Bush was responsible for the creation of America 2000, an initiative consisting of educational goals to achieve by the year 2000. HUDGINS & VACA, *supra* note 67, at 9. President Clinton continued this initiative by signing Goals 2000: Educate America Act, Pub. L. No. 103-227, 108 Stat. 125 (1994) (codified in scattered sections of 20 U.S.C.), which announced the federal government's intention to coordinate educational technology activities and to monitor technological trends so as to encourage effective use of technology in the schools. Goals 2000: Educate America Act,

become increasingly involved in education.[184] National problems such as racial and gender discrimination,[185] lack of accommodations for students with disabilities,[186] and inequality between schools regarding the amount of resources available to them frequently motivate this increased federal participation.[187] The potential for a generation of students to develop RSIs presents a national problem justifying

Pub. L. No. 103-227 § 231(1)(B), (8), 108 Stat. 125, 152 (1994) (codified at 20 U.S.C. § 5861 (1994)). President George W. Bush has included provisions in his education plan that enhance education technology programs with increased funding aimed at allowing schools to experiment with innovative programs. NO CHILD LEFT BEHIND, *supra* note 85. Versions of the bill have passed both the House and the Senate and a joint committee is now working on the final bill. U.S. DEP'T OF EDUC., STATEMENT OF U.S. SEC'Y OF EDUC. ROD PAIGE REGARDING PASSAGE OF H.R.1, May 23, 2001, *at* http://www.ed.gov/PressReleases/05-2001/05232001b.html (last visited on Oct. 12, 2001) (on file with the North Carolina Law Review); U.S. DEP'T OF EDUC., STATEMENT OF U.S. SEC'Y OF EDUC. ROD PAIGE REGARDING PASSAGE OF S.1 (June 14, 2001), *at* http://www.ed.gov/ PressReleases/06-2001/06142001a.html (last visited Oct. 12, 2001) (on file with the North Carolina Law Review); Committee on Education and the Workforce, House, Senate Education Leaders Begin Final Work on President Bush's Education Plan (July 19, 2001), *at* http://edworkforce.house.gov/press/press107/ hr1conf71901.htm (last visited Oct. 12, 2001) (on file with the North Carolina Law Review).

184. Riley, *supra* note 155, at 35.

185. *Id.* at 39. For example, Congress has guaranteed that students will not be denied access to a quality education through such legislation as Title IX of the Education Amendments of 1972, which among other things prohibited sex discrimination in schools. Pub. L. No. 92-318 § 901, 86 Stat. 235, 373 (1972) (20 U.S.C. § 1681). Title IX was a driving force in closing the "gender gap" in school athletics and increasing the involvement of females in math and science courses. Riley, *supra* note 155, at 39. Similarly, the Supreme Court has crusaded against discrimination through landmark cases such as *Brown v. Board of Education*, 347 U.S. 483 (1954), which held that segregation in public schools was unconstitutional as a violation of the Equal Protection Clause of the Fourteenth Amendment. *Id*. at 495.

186. Riley, *supra* note 155, at 39. The Americans with Disabilities Act, enacted in 1990, prohibits discrimination against the disabled by entities receiving public funds, such as public universities. 42 U.S.C. § 12132 (1994). In 1994, Congress enacted the Individuals with Disabilities Education Act, 20 U.S.C. § 1400, described *supra* notes 95–101, 103, and 116–17 and accompanying text. The courts have also intervened to protect the rights of disabled students. *See, e.g.,* Honig v. Doe, 484 U.S. 305, 328 (1988) (protecting the rights of emotionally disturbed students by refusing to allow suspension for disruptive conduct stemming from their disabilities). Yankton Sch. Dist. v. Schramm, 93 F.3d 1369, 1376 (8th Cir. 1996) (requiring school to continue providing necessary accommodations for a disabled student under the IDEA); Crawford v. Pittman, 708 F.2d 1028, 1035 (5th Cir. 1983) (requiring state to consider IEPs for disabled children within the state school system that would last beyond the normal 180-day school year).

187. Riley, *supra* note 160, at 37; *see also* Improving America's Schools Act, Pub. L. No. 103-382, 108 Stat. 3518 (1994) (codified as 20 U.S.C. § 6301 (1994)). The Improving America's Schools Act was a revision of an earlier act, the Elementary and Secondary Education Act, which included the goals of ensuring high standards for all children, distributing resources where the needs are greatest, and improving the quality of education by offering additional professional development for teachers. 20 U.S.C. § 6301(d); DIGEST OF EDUCATION STATISTICS, *supra* note 12.

similar federal intervention. After all, the impact of students with RSIs would be felt nationwide, affecting both the future workplace[188] and the health care system, where the costs of treating RSIs would continue to multiply.[189]

At the same time, any solution must be careful to allow flexibility for the states, recognizing that educational decisions typically are left to them.[190] Preferably, the solution would be implemented at both levels.[191] Federal intervention may be needed to generate awareness of the problem, operate as a clearinghouse for information and guidelines regarding the prevention of RSIs, provide some minimum uniformity, and perhaps even aid in funding—but the states should be allowed minor departures from a national uniform approach, thus creating a plan for the prevention of RSIs among children that suits each state's particular needs.

VI. WORKING TOWARDS A SOLUTION

The prevention of RSIs among schoolchildren is likely to be a daunting challenge. However, public schools may not have to create every element of the solution from scratch. Because RSIs have been a problem in the workplace for several years,[192] public schools may be able to borrow the essentials from attempted workplace solutions. In November 1999, the Occupational Safety and Health Administration (OSHA) announced a proposed ergonomics rule aimed at preventing further development of RSIs in employees through the use of ergonomics programs at each workplace where a risk for RSIs exists.[193] The proposed ergonomics rule would have required employers whose workers are at risk for musculoskeletal disorder hazards (MSDs) or other ergonomic-related injuries[194] to implement

188. *See supra* notes 36–39 and accompanying text.

189. *See supra* note 37 and accompanying text (noting an average RSI claim costs $29,000 in medical care and lost wages). Wrist-related RSIs account for 2.7 million physician office visits annually. NATIONAL RESEARCH COUNCIL & INSTITUTE OF MEDICINE, *supra* note 31, at 20.

190. HUDGINS & VACA, *supra* note 155, at 6; Riley, *supra* note 155, at 38; *see also supra* notes 155–56 and accompanying text (noting that public education has been predominantly a state function).

191. *See* Riley, *supra* note 155, at 45 ("This is not an 'either/or' solution—more federal control versus less local control.").

192. *See supra* notes 36–39 and accompanying text.

193. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. 65,768, 65,768 (Nov. 23, 1999). The rule was the culmination of more than twenty years of research on programs aimed at minimizing workplace injuries. *Id.* at 65,770.

194. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 66,068. OSHA's proposed ergonomics rule speaks in terms of musculoskeletal disorder hazards, a term defined as

an ergonomics program in their workplace.[195] Employees would have been educated regarding common risks for MSDs, signs and symptoms, and the importance of reporting the symptoms early.[196] At the same time, the employer would have been required to identify and minimize "ergonomics risk factors" that could result in a MSD.[197] This process would have required the employer to analyze the work area and question employees of varying sizes regarding any physical difficulties they experienced while performing their assigned tasks[198] and any potential improvements to their work areas.[199] Finally, employers would have been required under the proposed rule to provide any necessary work restrictions to avoid aggravating a MSD,[200] including access to a "health care professional" if needed.[201]

Structurally, OSHA's proposed ergonomics rule was formulated in a question and answer format, designed to aid comprehension.[202] Moreover, the rule was not a set of specifications, but rather a broad set of guidelines, allowing each employer to create an ergonomics program that best suited his individual needs.[203] The proposed rule was also accompanied by a number of supporting documents to help

injuries or disorders involving muscles, tendons, joints, spinal discs, nerves, ligaments, and cartilage. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 65,783. This broad definition includes RSIs such as carpal tunnel syndrome. *Id.*; *see also supra* note 31 and accompanying text (providing a list of other common names for RSIs).

195. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 65,788.

196. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 66,070. This educational and reporting system must be more than a "paper program"; it must be implemented actively throughout the workplace. *Id.* MSD symptoms were to be reported to a specially designated person. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 66,070.

197. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 66,070. Among the risk factors identified are repetition, tasks involving long reaches, work surfaces that are too high or too low, sitting for a long time, and bending or twisting frequently. *Id*. at 66,070–71.

198. *Id.* at 66,070.

199. *Id.* at 66,071.

200. *Id*. at 66,073. OSHA defines work restrictions as limitations on the injured employee's exposure to hazards, which may involve revising the employee's current tasks, transferring the employee to a different task, or removing him or her from the workplace. *Id*. at 66,078.

201. *Id*. at 66,073. The health care professional would evaluate the employee's condition, recommend additional work restrictions, and inform them of any other activities that could aggravate the MSD. *Id.* This procedure need not require the services of a physician, as long as the health care professional is a licensed professional acting within the permitted scope of practice. *Id*. at 66,075.

202. The title of each section was phrased as a question, followed by regulatory language in response to the question. *See generally,* OSHA Proposed Ergonomics Rule, 63 Fed. Reg. At 65,767 (Nov. 23, 1999).

203. *See* OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 65,776. This approach recognizes that the employer is closest to the problem, and thus, best able to address the issue. *Id*.

employers identify potential hazards for MSDs, as well as to suggest the best means of implementation.[204] Finally, the OSHA standard did not necessarily require complete elimination of the risk, but instead focused on materially reducing the hazards or reducing them to the greatest extent feasible.[205]

Although the Clinton administration managed to obtain congressional approval for OSHA's proposed ergonomics rule during its last days, Congress, with the support of the Bush administration, has since repealed it.[206] Republicans attacked the rule for being "over-broad, unworkable and vague."[207] President Bush criticized the bill because it "would cost employers, large and small, billions of dollars annually while providing uncertain new benefits."[208]

In response to the criticism of the proposed ergonomics rule, OSHA is currently in the process of formulating a new solution that will address both President Bush's and Congress's concerns.[209] In June 2001, OSHA announced three critical areas of further exploration and discussion: (1) establishing an accepted definition of ergonomics injury; (2) determining whether an ergonomics injury was

204. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 65,771, 65,773, 65,775.

205. *Id*. at 66,071–72.

206. Act of Mar. 20, 2001, Pub. L. No. 107–5, 115 Stat. 7 (2001); Mike Allen, *Bush Signs Repeal of Ergonomics Rules; Administration Promises Business-Friendly Workplace Safety Regulations*, WASH. POST, Mar. 21, 2001, at A6; Helen Dewar & Cindy Skrzycki, *Workplace Health Initiative Rejected; Senate Acts to Kill Ergonomics Rule*, WASH. POST, Mar. 7, 2001, at A1.

207. Dewar & Skrzycki, *supra* note 207. Six Democrats joined the Republicans to repeal the measure. *Id*. OSHA was criticized particularly for issuing the rules a day before the National Academy of Sciences (NAS) released its ergonomics study. Editorial, *Rulemaking Gone Awry: The Bush Administration Should Continue to Scrutinize His Predecessor's Last-Minute Regulations, Many of Which Would be Costly to Follow*, ATLANTA J. CONST., Mar. 8, 2001, at A22. The NAS study emphasized that MSDs are not uniquely the product of work exposures, but can have a variety of causes, including other physical activities such as sports, household work, and exercise programs. *Id*.

208. Dewar & Skryzcki, *supra* note 207. OSHA estimated that its proposed plan would cost employers approximately $4.2 billion a year to comply with the standard, or about $900 per business. OSHA Proposed Ergonomics Rule, 64 Fed. Reg. at 65,768, 66,003. One should not read President Bush's criticism of OSHA's proposed rule as a complete disapproval of any ergonomics program. After signing the bill to repeal the proposed rule, the President issued this statement: "The safety and health of our nation's workforce is a priority for my administration. . . . Together, we will pursue a comprehensive approach to ergonomics that addresses the concerns surrounding the ergonomics rule repealed today." Allen, *supra* note 206.

209. Susan E. Dudley, Editorial, *Let OSHA Take Lead in Ergonomics Reform*, CHI. SUN-TIMES, July 21, 2001, at A16. In July 2001, Secretary of Labor Elaine Chao conducted several public forums around the country to address possible solutions to ergonomic hazards in the workplace. Announcement of Public Forums on Ergonomics, 66 Fed. Reg. 31,694 31,695 (Sup. Doc. # AE2.106:66/113) (June 12, 2001).

caused by work or non-work-related activities, or both, and what the appropriate response should be; and (3) identification of the most useful, cost-effective types of government involvement to address these injuries.[210] In addition, OSHA announced that while any new approach should focus on the prevention of work-related injuries, it must be flexible enough to apply to varying businesses and workers, recognize the costs of compliance to small businesses, and contain "short, simple and common sense instructions."[211] Labor Secretary Elaine Chao also indicated that the new approach may involve voluntary guidelines instead of the rigid rules of the failed proposal.[212]

Regardless of OSHA's final approach, public schools should emulate OSHA's solutions to RSI injuries in the workplace.[213] Public schools will need to determine the appropriate response for RSI injuries possibly caused by a combination of computer usage at school and other activities, just as OSHA must respond to RSI injuries in employees possibly caused by a combination of work and non-work activities. Further, teacher and student feedback should be encouraged whenever possible,[214] paralleling OSHA's attempts to involve employers and employees in the solution. Similarly, a solution that seeks voluntary compliance, rather than rigid requirements, could avoid burdening school systems that already face budget difficulties of time and money.[215]

210. Announcement of Public Forums on Ergonomics, 66 Fed. Reg. at 31,695 (outlining the three questions presented at the forum).

211. Announcement of Public Forums on Ergonomics, 66 Fed. Reg. at 31,695 (highlighting the need for clarity).

212. Susan Strother Clarke, *Ergonomics Guidelines Are at Hand But Some Worry the New Federal Rules Won't Do Enough To Reduce Repetitive-Stress Injuries at Work*, ORLANDO SENTINEL, Aug. 11, 2001, at B1. Although many labor groups are hesitant to embrace voluntary guidelines, such an approach has been successful in the meat-packing industry, where the rate of RSIs dropped thirty-nine percent after OSHA issued voluntary ergonomics rules for the industry. *Id.*

213. President Bush's support of RSI prevention programs for the workplace, *see infra* note 208, may indicate a willingness to address RSIs in schools, if evidence of the problem is presented to him.

214. Younger students may not be able to identify specific problems with the computer arrangement in their schools. Older children, however, are more apt to identify areas where they feel the computer arrangement is forcing them to assume less comfortable positions. *See* Royster & Yearout, *supra* note 31, at 410 (revealing that older students were more likely than younger students to suggest an ergonomic change). Input from a variety of different-sized children, along with an analysis of the risk factors associated with existing computer labs is imperative. *See supra* notes 139–41 and accompanying text. Variance in size is most critical in elementary schools, where kindergartners and fifth-graders may use the same workstation. ARMSTRONG & CASEMENT, *supra* note 3, at 147.

215. The benefits and experiences of schools who choose to implement ergonomics programs early could serve as models for other schools to follow.

Moreover, any solution for the prevention of RSIs among schoolchildren should be presented to public school systems as clearly as possible, perhaps utilizing the question and answer format of the failed OSHA ergonomics rule with a list of additional helpful resources for school administrators.[216] Above all, the solution must be flexible enough to allow state and local education agencies the freedom to adapt the solution to meet the unique needs of individual school systems,[217] and should recognize that an effective approach does not necessarily entail complete elimination of the risks for RSIs.

Although inexpensive solutions may exist for public schools, any ergonomics program would result in some additional costs.[218] Schools may need federal funding to cover these additional costs.[219] In the past, schools wishing to improve their use of technology received federal funding in the form of both direct and competitive grants.[220]

216. This feature continues the federal government's long-standing tradition of acting as a clearinghouse for educational resources. *See* Riley, *supra* note 155, at 36; *see also supra* note 173 and accompanying text (describing how the federal government is better suited to conduct educational research).

217. *See supra* notes 165–72 and accompanying text. Choosing this approach for a solution would comport with the traditional national approach to education—strengthening and supporting, but not exercising total control over the states. Riley, *supra* note 155, at 36. Moreover, this approach will allow those closest to the problem to have a greater say in the solution. *See* Heise, *supra* note 157, at 360–61 (discussing the presumed advantages of developing educational policy at state and local levels of government).

218. *See supra* notes 152–53 and accompanying text (discussing inexpensive solutions that could prevent RSI among children).

219. *See supra* notes 176–78 and accompanying text (detailing the federal government's traditional funding of public schools).

220. Most of the funding provided by the U.S. Department of Education comes in the form of direct, or formula based grants. U.S. DEP'T OF EDUC., OVERVIEW OF GRANTS AND CONTRACTS, *at* http://www.ed.gov/topics/ topics.jsp?&top=Grants+%26+Contracts. The Department of Education also provides funding in the form of competitive, or discretionary grants, in which applications for funding are viewed in light of the requirements specified for eligibility for funding in a particular program. U.S. DEP'T OF EDUC., WHAT SHOULD I KNOW ABOUT ED GRANTS? (Sept. 1998), *at* http://www.ed.gov/pubs/KnowAbtGrants/ pt298.html. The Goals 2000: Educate America Act, Pub. L. No. 103-227, 108 Stat. 125 (1994), (codified as amended at 20 U.S.C. § 5801–5918) provides an example of both formula and discretionary funding. The Act established guidelines for the use of educational technology, ensured that federal educational policies facilitated the use of technology, enabled the federal government to act as a conduit for information regarding advancements in technology, and promoted professional development for teachers on how best to use technology in the classroom. Educate America Act § 231, 108 Stat. at 151–52; 20 U.S.C. § 5861–5864 (repealed Oct. 20, 1994). To achieve these means, the Secretary of Education was authorized to provide funds to the states, by means of either direct grants, or competitive grants. Educate America Act, § 234 (b)(1)–(2), 108 Stat. at 156. The funding provisions of Goals 2000 were repealed in 1994. 20 U.S.C. § 5861–5864 (repealed Oct. 20, 1994).

President Bush, however, has attempted to streamline educational technology funding in his proposed 2002 education budget into a single, performance-based grant program.[221] Under Bush's proposal, each state would be allotted a specific amount of educational technology funding to distribute to local school systems, giving priority to schools in rural and high-poverty areas.[222] To ensure that these funds will not be wasted, states must set performance goals that would indicate how the federal grants have been used to improve student achievement.[223] Once the funds have been allocated to local schools, they may be used for a variety of purposes, including the purchase of computer equipment and software packages, as well as training for teachers.[224] The purchase of ergonomic furniture and additional training for teachers on the prevention of RSIs may thus be eligible for federal funding, thereby easing the burden for states.

CONCLUSION

The workplace is not the only arena where RSIs pose a threat. Research indicates that children are also at risk for the development of these debilitating disorders through their use of computers at school. Unfortunately, while attention has been well documented in the workplace, the goal of prevention of RSIs in our public schools has garnered little recognition. Not surprisingly, finding a solution is difficult, both in terms of the content of the solution and the best means for implementation. Lawsuits are likely to be an ineffective solution, given problems of governmental immunity and causation. Taking a "wait and see" approach is unacceptable because it could prove costly to schools that would be required to meet the needs of students with RSIs under the provisions of the Individuals With Disabilities Education Act. The best solution is a proactive approach,

221. U.S. DEP'T OF EDUC., FISCAL YEAR 2002 BUDGET: SUMMARY AND BACKGROUND INFORMATION 15 (2001), *at* http://www.ed.gov/offices/OUS/Budget02/Summary/finalpr.pdf (last visited Oct. 12, 2001) (on file with the North Carolina Law Review). The 2002 budget has not yet been approved by Congress and has been put on hold due to the events of September 11, 2001. Funding for education has continued at the 2001 level. U.S. DEP'T OF EDUC., BUDGET NEWS (2001), *at* http://www.ed.gov/offices/OUS/budnews.html

222. *Id.* The total amount of educational technology grants requested by President Bush is $817.1 million. *Id.* at 5. Of this amount, North Carolina would be allotted $16,598,171 to distribute to its local school systems. U.S. DEP'T OF EDUC., FUNDS FOR STATE FORMULA-ALLOCATED AND SELECTED STUDENT AID PROGRAMS FOR NORTH CAROLINA (2001), *at* http://www.ed.gov/offices/OUS/Budget02/02bystate.pdf (last visited Oct. 12, 2001) (on file with the North Carolina Law Review).

223. FISCAL YEAR 2002 BUDGET, *supra* note 225, at 15.

224. *Id*.

one that includes the elements of education, ergonomics, posture, and body awareness. While states should be free to implement a solution that best suits their needs, the federal government should continue in its traditional role of providing financial support and disseminating much-needed information to the states. Thus, this Comment concludes that the current state of in-school computer usage coupled with the potential number of students who may develop RSIs in the future requires national attention similar to the attention OSHA is currently giving to RSIs in the workplace.

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