From the Editor

Pardon Me for Being an Alarmist, But...

BY RONALD E. KOETZSCH, PhD

Two articles in this issue deal with the possible health hazards of WiFi (wireless fidelity) technology, particularly in regard to children. In the interest of full disclosure, I must admit that I have never been an advocate of WiFi.

Fourteen years ago, I began using a computer that was capable of connecting to the Internet. At that time, the main offices of the Association of Waldorf Schools of North America were in a building twenty yards from where my office was—and still is—although the Association has since moved. The Association tech person suggested that I use WiFi to connect to the Internet. He explained that a transmitter in the main building would beam a high frequency radio signal to a router in my office, which would then beam the signal to my computer.

I am not a scientist by training, but something about all those radio waves bouncing constantly around my office didn’t appeal to me. A little inner voice said, “No.” “What is the alternative?” I asked the tech fellow. “Connect by a cable into the phone jack near your desk,” he replied. “Let’s go cable,” I said. The tech guy looked surprised but agreed.

Four years ago, I was at a conference in Hawaii with Dr. Michaela Glöckler, head of the Medical Section at the Goetheanum. I asked her advice about a close friend who was recovering from a serious illness. Dr. Glöckler strongly recommended two things to support my friend’s immune system: One—do eurythmy every day! Two—stay out of WiFi environments!

Today, WiFi is nearly ubiquitous—in schools, libraries, offices, homes, coffee shops, outdoor public places, airports, buses, and trains. In what is, in terms of human history, less than the blink of an eye, we have become dependent on being able, anywhere and anytime, to check our email, read the news, shop online, update our Facebook page, and view the latest grumpy cat video. And in the process, we have created living and work environments that typically are permeated by radio frequency radiation (RFR) twenty-four hours a day, seven days a week.

Although Waldorf schools diverge in many areas from the mainstream culture, on the issue of WiFi they seem to have gone very much with the flow. This past February, at a conference on technology in education held at Rudolf Steiner College, Dr. Glöckler was the keynote speaker and spoke several times about WiFi technology and its possible dangers. One morning, with over 300 Waldorf teachers and administrators in the hall, I asked, “How many people are at schools with a WiFi system?” Almost everyone in the audience raised a hand. Then I asked, “Was there at the installation of WiFi, or has there been since, any discussion about possible adverse effects and health concerns?” About five people raised a hand.

WiFi is part of a larger phenomenon known as electromog. Electromog includes the ambient pulsed radio frequency radiation generated by WiFi routers, cell phone towers, cell phones, cordless phones, and even “baby watchers.” The term refers also to the electromagnetic fields (EMFs) generated by power lines, electrical motors and appliances, including computers, and by electrical cables and wires. Unlike air pollution or noise pollution, electromog cannot normally be perceived by the five senses. One needs, ironically, an electrical device, to detect and measure its presence.

There is a lot of controversy about the possible negative effects of WiFi, cell phones, and related devices. The people who are concerned about and bring up the topic can be an annoyance to those who do not perceive any possible danger and who do not appreciate a major source of convenience in their lives being called into question. However, we parents and educators, for our own sake and for the sake of our children, should inform ourselves about this new presence in our daily lives. At the very least, we should be aware that we are all subjects in a massive, unplanned, largely involuntary biological research project, and no one will know the results for a long time.
Dealing with WiFi and Cell Phone Radiation

BY MICHAEL D’ALEO, MA

Michael D’Aleo studied mechanical engineering at Rutgers University (New Jersey) and later earned a master’s degree in education at Sunbridge College (New York). Michael is one of the founders of SENSRI—The Saratoga Experimental Science Research Institute and is director of research for the institute. Michael has taught chemistry and physics at the Saratoga Springs (New York) Waldorf High School for many years.

In the late 1980s and early 1990s, I worked in the electronics industry and was peripherally involved in the development of some of the first-generation wireless technologies. At that time, the focus was on using the infrared section of the electromagnetic spectrum—there was some concern about the health effect of using microwaves. In the end, the microwave technology won out as the basis of wireless communication.

In 2005 I developed electrosensitivity (ES), a hypersensitivity to electromagnetic fields (EMFs) and to pulsed radio frequency radiation (RFR). I later learned that the condition is not uncommon among people who have worked for a long time in the electronic communications industry. I began to feel acute symptoms—difficulty sleeping, a feeling of unease, and physical exhaustion—when in a WiFi environment or when close to someone using a cell phone or computer with a wireless connection. I could (and still can) actually sense the disturbing, external electronic activity in certain parts of my body. Working with a physician who practices anthroposophically extended medicine, I was able to reduce my electrosensitivity significantly. Part of the treatment involved homeopathic remedies.

I am still very interested in and concerned about electronic pollution in the environment. I do not own or use a cell phone. I do not have WiFi in my home. Recently, I have begun giving talks and workshops around the country on the effects of cell phones and WiFi. Some of the groups who invite me are connected to Waldorf schools and some are not. The interest in the issue is growing and becoming more mainstream. While only a small percentage of people are electrosensitive, everyone is being affected to some degree, whether they are conscious of it or not. ES people are like the canaries in the mine.

As a teacher, I am, of course, very concerned about WiFi in schools and about the use of cell phones by young children. The frequency of pulsed microwave radiation (millions of cycles per second) is very close to the frequencies used by the human body to regulate some of its life processes. An external electronic influence can create what is called entrainment, a forced deviation in the body of its normal electrical patterns. In my opinion, some of the problematic behavioral and cognitive changes that teachers have observed in children in recent years are linked to cell phone use and exposure to WiFi.

Ways to reduce exposure to electromagnetic fields and to pulsed radio frequency radiation include the following:

1. Do not have WiFi in a home or work environment.
   Use a hardwired connection to access the Internet.
2. If you can’t live without WiFi, turn it off at night and when it is not being used. A router reboots in just a few seconds. Skeptics should turn off the WiFi for three nights in a row to judge its effect on sleep.
3. Whenever possible, use a hardwired instead of a wireless connection. If you have access to a landline telephone, use it rather than a cell phone. Do not use a wireless printer-computer connection.
4. Work as far away from the WiFi router as possible. Also, use a hands-free cell phone that doesn’t need to be held against the head. The effects of EMF and RFR rapidly drop off as the distance from the device increases.
5. Never use a laptop on your lap, especially if you are connected to WiFi.
6. Consult the website cellphonesprocon.org to find out which cell phones have the lowest and highest emissions. They vary greatly.
7. Limit the use of cell phones by children. The Department of Health in the United Kingdom suggests that children under sixteen make only short, essential calls.
8. Avoid using cordless phones. Some emit more radiation than cell phones.
9. Do not carry a cell phone in a pocket or against your body.
10. Unless you are expecting an important call, have the cell phone turned off and in “airplane mode.”
Saying Good-Bye to WiFi
A Waldorf School Takes a Precautionary Step

BY RONALD E. KOETZSCH, PhD

In the summer of 2010, a prospective parent walked into the office of Caroline Askew, admissions director at the City of Lakes Waldorf School in Minneapolis. The parent was an attorney with two young daughters. Caroline is accustomed to answering all kinds of questions from parents, but this mother had questions and concerns that Caroline had never heard before.

The parent first inquired whether or not the school utilized a WiFi system—an array of wireless transmitters that allows persons with laptop computers or smartphones to access the Internet and their email from any location in the building. On learning that WiFi was in use, she asked Caroline, “Would the school be open to the possibility of removing the system?” WiFi transmitters constantly emit pulsed radio frequency radiation (RFR), and this mother was concerned about the possible effect on the health of her children. She had done much research and had compiled a collection of documents—articles from scientific journals and abstracts of scientific papers—that pointed to the possible dangers of microwave radiation in a WiFi environment. She asked Caroline if the school would be willing to consider those documents in order to make an informed judgment.

City of Lakes first installed a WiFi router in 2004 in preparation for an accreditation team visit by the Association of Waldorf Schools of North America. WiFi use was limited until 2008, when the school hosted the Association's annual summer conference. In time, staff members came to depend on the wireless network to work throughout the day on personal laptops. The majority of faculty and staff did not question the safety of the WiFi system. One class teacher was an exception and frequently caused havoc and frustrated his colleagues by intentionally disabling the system.

This teacher was very sensitive to electrical influences (electrosmog) and tried to raise awareness about the problem. He left his class in the middle of fourth grade due to health issues.

At the close of her interview with the concerned parent, Caroline Askew, herself a mother of young children and a person with broad interests, agreed to read through the binder of material. Most of the documents were abstracts of scientific studies on the effects of cell phone use and exposure to the pulsed radio frequency radiation emitted by cell phones. The studies also included research on possible health concerns related to WiFi routers, cordless phones, and cell phone towers. The research had been conducted at various universities and research centers in Sweden, Australia, China, the United States, and other places around the world.

Two documents from the Parliamentary Assembly of the Council of Europe expressed deep concern about the “potential dangers of electromagnetic fields and their effect on the environment.” One article mentioned that the World Health Organization had identified pulsed radio frequency radiation as a class two carcinogen. Another reported that some public school systems in Canada had removed WiFi from their schools out of concern for the health of the children. A letter from David O. Carpenter, MD, Director, Institute for Health and the Environment, University at Albany—SUNY, strongly advised against the use of WiFi in schools. One recurring point was that whatever ill effects pulsed radio frequency
emissions may have, children, because of their size and ongoing, rapid growth and development, would be particularly vulnerable.

Caroline shared the concerns with her colleagues. She asked Betsy Leighton, director of IT at the school, and Bob Amis, a science teacher, to read through the material and offer additional perspectives. In February 2011, Caroline and other City of Lakes staff attended the regional Great Lakes conference at the Chicago Waldorf School. The keynote presenter was Michael D’Aleo, a highly respected Waldorf high school science teacher. Caroline asked Michael if he thought the concerns about WiFi were credible. He answered in the affirmative and added that he is one of the small percentage of the population (about 3%) who are electrosensitive (ES), i.e., extremely sensitive to electromagnetic and radio frequency influences.

Following the regional conference, a presentation of the issue was made at a City of Lakes weekly staff meeting. Most staff members were open to further investigation, although there was significant reluctance to eliminate the convenience of WiFi. Some people had recently purchased iPads, which cannot function without a wireless connection to the Internet. A few faculty and staff were and remained staunchly skeptical.

At this point, the mother who had initially raised the concern and was now a parent in the school offered to pay for an inspection of the school building by a company called Intentional Environment. The company specializes in creating healthy environments by identifying and eliminating energetic interference created by electromagnetic fields (EMFs), pulsed radio frequency radiation, and other factors.

When the building WiFi was turned off, they were able to assess the levels of the AC (alternating current) electric fields coming from building wiring, appliances and other electronic devices. In some areas, they detected what is called “dirty electricity.” This is AC current that has tiny energy spikes in the sine wave of the current flow. Dirty electricity is also considered a possible health risk.

The team discovered other problematic factors:

- Fluorescent lights emitting unnecessary RFR
- Electric cords wrapped around metal water pipes and creating very strong electromagnetic fields
- A strong EMF created by a large transformer located on a pole right outside one of the lower-grade classrooms
- “Dirty electricity” being generated by the motor for the school elevator

Following the assessment, the company gave the school a sixteen-page report, describing the problems present and recommending measures for remediation. The first and most important recommendation was to remove the WiFi routers from the school and have staff and faculty connect to the Internet by Ethernet cables instead. Other recommendations included rewiring lights, putting long extension cords in metal conduits, using outlet filters to eliminate dirty electricity, installing metal window screens to prevent radio frequency radiation from coming in from the outside, and not placing student desks in particular areas of certain classrooms. The recommendations were not particularly costly, and the school was able to implement many of them. Additional improvements have been made each year since.

City of Lakes Waldorf School has not chosen to publicize its decision to remove WiFi. Staff and faculty have adapted to the nonwireless environment. Parents and visitors to the school are not surprised when they discover they cannot get a WiFi connection to the Internet with their laptop or smartphone. There are, after all, “Cell Phone Free Zone” signs in the school lobby. A visitor with a laptop can, if necessary, access the Internet via a hardwired connection.
Is WiFi Really Harmful?

In the binders presented to the school by that first concerned parent, there were about fifty abstracts of scientific studies. Some focused on the effects of cell phone use: the combined impact of the heat and the pulsed radio frequency radiation that cell phones generate. Those studies indicate the following problematic effects of relatively long-term (ten years or more) cell phone use:

- Oversecretion from the parotid (saliva) gland on the side used for the cell phone
- Increased risk of tumors in the parotid gland
- Increased risk of glioma (a brain tumor that develops from glial cells)
- Increased risk of acoustic neuroma (a tumor in the ear that develops from nerve cells)
- A correlation between the amount of cell phone use and behavioral and mental health problems

Most of the studies involved the effects of short-term exposure to pulsed radio frequency radiation on human beings, on animals (rats, mice, rabbits), and on plants. Some of the studies were carried out on the actual subjects (in vivo), and others involved cells taken from the subject and exposed while in a test tube or other vessel (in vitro). These various studies indicated that exposure to pulsed radio frequency radiation does the following:

- Changes electroencephalogram (EEG) patterns in the brains of human beings— in particular, a reduction in alpha waves, associated with relaxation, with women being more affected than men
- Reduces the ability of human adults to do tasks involving spatial memory
- Decreases the attentiveness of young adults when performing memory tasks
- Affects melatonin levels during sleep
- Affects the changes in blood chemistry related to the circadian rhythms of waking and sleeping
- Causes breakdown in DNA strands and thus changes the structure and functioning of genes, i.e., is genotoxic (an in vitro study of human cells and an in vivo study involving brain cells of rats both indicated this effect)
- Adversely affects the quality, viability, duration and motility of sperm cells (this effect also was observed with human cells in vitro and rat cells in vivo)
- Negatively affects the function of the thyroid gland (in rats)
- Decreases the function of endocrine cells that secrete digestive hormones (in rats)
- Affects the function of the inner ear (in rabbits)
- Affects the function and structure of normal human hemoglobin (in vitro)
- Disturbs the normal functioning of worker honeybees
- Causes genetic damage in mung beans and inhibits their germination and root formation
- Compromises the blood-brain barrier (the BBB is a selective permeable barrier that allows into the brain fluid the nutrients, water, and other things the brain needs, but keeps out potentially toxic substances; the relevant study involved rats)

These and many other studies are readily available on the Internet. The website of the National Center for Biotechnology Information, whose mission is to advance science and health by providing access to biomedical and genomic information, can be found at www.ncbi.nlm.gov/pubmed

It should be noted that there are also studies that indicate little or no ill effect from cell phone use and exposure to WiFi. These studies, like the studies just cited, are of necessity short-term studies. Even a study focusing on the effects of ten years of cell phone use is, in the context of a normal human life span, a short-term study. In any case, there is as yet no unanimity in the scientific community about these issues. Studies funded by the communications industry tend to find no harmful effects.

Rudolf Steiner, founder of Waldorf Education, considered electricity a realm of “subnature.” Early in the 1900s, Steiner predicted that by the end of the century there would be so much electrical influence in the environment that it would be detrimental to human health.

Dr. Michaela Glöckler, who is head of the Medical Section at the Goetheanum, the center of the world anthroposophical movement located in Dornach, Switzerland, has for some years been warning about the dangers of WiFi. This past February at a conference on technology in education at Rudolf Steiner
College in California, she addressed the issue. Dr. Glöckler explained that a WiFi router, even when it is not in use, is constantly emitting a very regular high frequency pulse of energy. The human body also operates with electrical energy, and the cells communicate by means of electromagnetic fields. However, the pulsation is slightly random and irregular and not exactly the same speed as that of the router. Thus, the pulsed WiFi signal can interfere with the natural, optimal functioning of the body.

Dr. Glöckler stated that we can and should use electronic technology. However, we should use it only when it is necessary. She strongly advised against the use of WiFi in schools when wired connections can serve the same purpose. She emphasized that children, due to their small size and rapid development and growth, are particularly at risk. Dr. Glöckler also advised people with serious health problems to avoid WiFi environments, since exposure may compromise the immune system. She pointed out that work spaces can usually be arranged to provide Internet access via a cable and, if WiFi is an absolute necessity, at least the router can be turned off when not in use.

In Dornach, Switzerland, the Goetheanum contains many offices, lecture rooms, a cafeteria, and other spaces where one would expect to find WiFi. However, WiFi is available only in a limited area on the ground floor of the building and only for visiting conference participants. In talks and private conversations, Dr. Glöckler has often speculated that WiFi may be the asbestos of the twenty-first century—something universally accepted as perfectly safe and then, in time, after much harm has been done, discovered to be a serious hazard.

Recent research has provided some evidence of the possible short-term effects of electromagnetic fields and pulsed radio frequency radiation. At this point, however, no one can know or predict the long-term effects. WiFi networks and the continuous exposure to radio frequency radiation are recent—only within the past fifteen years—factors in our daily lives. Long-term studies have not yet been possible. Until time allows such studies to be conducted, we and our children are subjects in an extended biological experiment.

In the decision to have WiFi in a school or in our homes, it is perhaps wise to apply the Precautionary Principle. This principle, developed in the early 1980s, is meant to guide decision making regarding ecological and health policies. In the agencies of the European Union, the Precautionary Principle is officially recognized as a determinative guideline in making decisions that affect the environment and public health.

The Precautionary Principle states that when a new device, activity, or policy is proposed, and before it is implemented, those who will provide and profit from it must prove conclusively that it is not harmful. The burden of proof should be on those proposing and promoting the innovation. Those who question or oppose the innovation should not be required to prove that it is harmful.

At this time, no one, including the very powerful electronic communications industry, has proven conclusively that exposure to WiFi is safe. There is no proof that short- or long-term exposure to WiFi for children or for adults is benign.

City of Lakes Waldorf School took a courageous and perhaps prescient step in eliminating WiFi and going back to hardwired access to the Internet. The school ran the risk of being perceived as alarmist and for taking a side in an unresolved scientific controversy. However, the school chose to act out of concern for the health and well-being of the students entrusted to its care.

The school is in good company, though. The Israeli Department of Education, the French National Assembly, the European Environmental Agency, the Council of Europe, and the German government are but a few of the many governments, government agencies, and scientific authorities which are now warning about and/or banning WiFi in schools. 

An outlet filter that reduces dirty electricity