There is significant diversity among the osteopathic schools: some are young, some are old; some are state schools, some are private. Some have small student bodies and some have large ones. Some have limited resources while others have more. Similarly, some of our schools are technically more sophisticated than others, maybe in specific elements such as in videoconferencing. However, there is much to learn from each other in harnessing the current information technologies to enhance the osteopathic educational process and osteopathic medical practice. It is for this reason and to initiate discussion that we summarize here some elements that seem to be necessary for such a transition. We use short examples from our experience at NYCOM.

1. The technologic transformation needs a manager.
Technology has been changing rapidly. Our communities are extremely diverse in technical competence, ranging from the very proficient to the very reluctant. It takes more than a couple of full cycles of activity for anything new to become part of the milieu. Some problems have simple (but not always obvious) solutions; others require a large commitment of resources. Technologic transitions are not to be managed on an ad hoc basis or always by committee. Limited resources require more extensive management. Every organization needs a manager to organize and direct the technologic transition.

NYCOM: Dean Stanley Schiowitz created an umbrella entity, the New Technologies Initiative, with the author (C.K.) as its director. The mandate given was to manage and direct the technologic transformation of the whole school with as free a hand as feasible.

2. Identify the problems, and then identify the solutions.
More than anywhere else, attempts at technologic transformations can easily degrade into collections of technically sophisticated “play” items. New gadgets are always enticing and confer a certain status and prestige on the owners. However, if they are not actually useful, people tend to tire of them after awhile; what is worse, the resources spent on the toys are no longer available when some real need or solution shows up. The way to avoid toys is to only implement solutions to specific problems that the community faces and such projects that will efficiently deliver a specific desired result. “Solutions in search of a problem” have no place when we are contending with limited resources. This problem-oriented approach is most feasible when academics are in command of the technology plan and its management.

NYCOM: We identified the following initial problems: (1) Our students lacked time; time-saving technology would have a positive effect on learning. (2) Our students did not have access to all the materials that the teachers used; technology that would permit our students to share the teaching materials would increase coherency and have a positive effect on learning. (3) Our school needed smoother, simpler ways of individual and collective communication between and within the
Kumar • Medical education

different components: students, faculty, staff, and administration.

Every “potential” technology is evaluated in terms of these identified needs, and only such technologies as are found useful are selected for implementation. This is not to say that toys have no role—those who implement the technology plans need to be familiar with what is evolving and what the future will be; occasional amusement is a good thing on campus. However, the distinction between these toys and necessary items needs to be clearly maintained, and resources spent on toys should be limited.

3. Identify the road from here to there; identify the timetable; get the plan together.

Once we have a manager and insight into the most important problems and their solutions, we need a plan and a schedule. To accomplish this, we need to clearly identify the relative priorities of different projects, funds available, people available, and vendors and other resources available. Based on these, a realistic sequence of steps to be implemented is constructed. The plan cannot be rigid but has to be a rolling plan that is continuously evaluated. At all times we need to know what to do next and what to do after that.

NYCOM: Earmarked project funds are available for the new technologies initiative from a technology fee paid by all students. These funds are segregated from general funds and are a reliable source. In addition, personnel costs and other special project funds are made available from the dean’s budget on an annual basis.

The personnel budget has increased with the level of integration of technologies into the NYCOM processes, roughly by one person in each of the past 5 years. We find it difficult to find and hire more than one or two persons of the ability and willingness that we seek each year.

We know exactly what we will be doing in the current year as well as the next. We have a clear sense of what we would like to do during year three. Beyond that, we routinely speculate about years four and five. This planning is done consistent with resources and priorities.

4. Start at the beginning.

Every project must have its starting point: every project that involves student learning must start with the faculty. Other projects may have other groups as their starting points. It is essential, however, that in each case an interested and core component of the campus community be identified where the specific project must take root.

NYCOM: All academic projects start with the faculty. We gave all faculty better hardware and fast Internet connections 4 years ago as the first project. This facilitated their production of organized material for the classroom. This was followed by better classroom presentation facilities—computers, projectors, etc. in the classroom. When such material accumulated, it was possible for a person specifically designated to collect all the material from the faculty, convert it to a coherent Web format, and organize an academic Web site—a logical and natural progression that facilitates work and minimizes wasted resources. This whole process could have been stopped anywhere with nothing wasted and significant improvements to the academic process retained. Identifying such natural workflow patterns and harnessing them requires starting at the correct beginning.

Similarly, the lead group for automating the process of disseminating grades and analyses to students after each examination were the secretaries in the academic offices at NYCOM. Such automation, closely patterned after the workflow experience of the academic secretaries, has saved significant amounts of time for both secretaries and students.

5. Take things one step at a time.

Effective cultural transitions require that the participating community not be overwhelmed. The introduction of new ways of performing tasks needs to be paced properly.

NYCOM: Our plan is to introduce one major new technology each year. Such technology is introduced to the first-year class and extended to subsequent years as the class progresses. Such pacing results in only one class having to struggle with the teething problems of each new technology. The new technologies initiative staff has to train only one class in the new technology each year. By the second year, the newly introduced technology of the previous year has become routine and moves into maintenance mode, supported with limited resources. Thus, we introduced e-mail and mailing lists to the class 4 years ago, Web-based academic materials 3 years ago, Web-based bulletin boards 2 years ago, extensive CD-ROM and Web-based video 1 year ago, and so on.

6. Make it simple.

True transformations require that initially the complexities of technology be absorbed into the background and the potential user be offered simple ways of using such technology. The urge to tell everyone that these are difficult things that are being done must be controlled—all users should continuously be told that it is all easy. The obvious reason is to decrease the fear that the complex technology evokes and speed its adaptation.

NYCOM: We have sought to make the adaptation of different technologies easy by extensive hardware and software support; capable support persons are made available on demand to fix hardware problems and to convert learning materials into electronic formats. While the more technologically advanced faculty may produce their own Web materials, other faculty members are shielded from having to learn myriad new tools. Such support makes it possible for all faculty to use new technology without too much frustration.

Similarly, we replace approximately one fourth of all personal computers each year so that everyone gets a new machine every fourth year. No time is wasted by persons making individual justifications and requests to get their
personal computers replaced. The overall process becomes simple.

7. Walk on two feet.
Change within larger communities often requires that members be offered choices. Choices in ways of doing the same thing usually encourage more persons to do one or the other overall. For example, if we give the students all administrative information through both a Web site and through e-mail, we will reach a larger fraction of students than if we use one modality alone. Current information technologies are well suited to multiple parallel implementations. Another reason for parallel implementations is the need to implement projects in a transitional technology for current use as well as cutover future technology.

NYCOM: We have attempted to use redundant parallel implementations as much as feasible. Handouts are available to students in printed form as well as on the Web. Video reviews are made available as Web video as well as CD video. Administrative messages flow through both mailing lists and Web-based bulletin boards. Auditoriums are hardwired at every seat using fast Ethernet as transitional technology while we plan to implement the next generation wireless standards later this year as the future technology. The availability of such equivalent options lets the user choose according to their preference and increases routine usage.

8. Embrace the criticism cycle.
A cademics different from business—an observation that can easily be lost when we seek technical perfection in our products. The students want, need, and deserve to get material that will help them learn better. Such material needs to be clear and coherent but not necessarily slick and sophisticated. A better way is to get the material out in the hands of the user group as soon as it is in pedagogically acceptable form, that is, the content is good but the presentation is not yet smooth. Getting it to the users early results in valuable feedback from the users. The content is modified based on this input and then the presentation made smoother and returned to the users. By the third cycle, the product is usually complete and smooth.

NYCOM: We noticed that students were using video cameras to tape monitors in the labs for future review. Video recorded this way was necessarily poor in production values, but the students were clear that these videos were very useful to them. This discussion resulted in the development model where we distribute material to the students as early as possible in the production cycle as feasible. This model is applied mainly to video-intensive material where getting the voice-overs just right is time-, resource-, and labor-intensive. By getting user input early, we make sure that the content is right and complete before expending resources in making the presentation smooth.

This should not become an excuse for sloppy work; simple Web documents etc (where the presentation can be smooth with minimal extra effort) should always be clear, complete and smooth. And of course the “good enough product—welcome criticism—cycle back” paradigm can never be applied to our interactions with the public at large; only the smoothest will do in the public arena.

9. Eighty percent is everybody.
In all attempted transformations, the urge to push for perfection (100% adoption rate early in the process) should be strictly avoided. It is a rule of thumb that the first 80% of change occurs with 20% expenditure of resources; a further 80% of resources must be expended to achieve 100% compliance. When resources are limited, it is probably best to aim for a critical mass to adopt new technologies and move on to the next project. The stragglers in the first project will eventually catch up on their own accord. Or, it will be that the stragglers of one project will be the early adopters of the next project.

NYCOM: In practical terms, once we have 80% adoption of any technology, we deem it to be firmly established and place it in the support and maintain mode. Not much further evangelization is performed, and the remaining 20% is expected to eventually catch up.

10. You cannot predict who will do what.
Social progress, much like biological evolution, is a partly stochastic process. When a new idea or a new technology is introduced into a heterogenous organization and its optional use promoted, in its early stages, a third or so of people will adopt the idea, another third will dislike and oppose the idea, and the remaining third will be indifferent. The organizational implication of the idea of stochastic development is that it is not possible to say with any certainty which group any given individual will be in for each new project.

NYCOM: We make sure to promote all new projects to all members of the community not just the ones we think will be interested. Often, we pick up a third of the group in the first pass, about 60% by the second year, and 80% or better by the third year.

11. Give up some control.
A plan implies criteria for the evaluation of the importance, significance, and success or failure of different processes, needs, and resources. As such, any plan diminishes the arbitrary decision-making authority that would otherwise rest with the project manager. If the manager makes all decisions on a case-by-case basis, others have reason to try to be in the good books of the manager. Clear and public planning, while it gives the organization better control over its future, diminishes the day-to-day control of the administrators over the other components of the organization.

NYCOM: We have specifically recognized and embraced the freedom that the new technologies plan and unfettered access to information exchange bring to the students in particular. Within broad limits of acceptable use, the users set their own limits of what is good and what is not. While excited discussions on the Web may be occasionally disconcerting,
it often strengthens the community as a whole.

12. Be creative.
Most of our notions will not work without creative application; each situation is different, and guiding any transformational process requires the daily resolution of numerous complexities. It is the differences that make each transformational effort unique and exciting.

NYCOM: While we emphasize creative solutions, this is one place where listing examples goes against the credo, so we shall not.

Acknowledgments
My work at NYCOM, which has been so much fun for so long, would not be possible without the full support of and the room to run given by Dean Stanley Schiowitz, D.O. I also gratefully acknowledge the support, hard work, and contributions of my New Technologies Initiatives colleagues, and the entire staff, students, and faculty of the New York College of Osteopathic Medicine of the New York Institute of Technology.