



Illinois State Board of Education

James T. Meeks, Chairman
Tony Smith, Ph.D., State Superintendent

Illinois Computer Science Task Force Meeting Minutes

Meeting Summary by Task Force Members

Friday, June 9, 2017

1:00 p.m.–4:00 p.m. CT

- Governor Bruce Rauner's Office, 205V Conference Room, 207 State House, Springfield, Illinois
- James R. Thompson Center, Office of the Governor, Video Conference Room (16th Floor), 100 West Randolph St. 16-100 Conference Room Chicago, Illinois

Attendees

Task Force Members

Chicago

Jake Baskin, Code.org

Don Yanek, Chicago Teachers' Union

Springfield

Steve Svetlik (chair), Computer Science Teachers Association

Austin Betz, Illinois Federation of Teachers

Randy Swikle, Illinois Press Association

Called In

Ali Karbassi, CoderDojoChi

Jerry Weinberg, Southern Illinois University

Brenda Wilkerson, Chicago Public Schools

Wayne Bevis, Principal, Lindblom Math and Science Academy

Illinois State Board of Education (ISBE) Staff

Brian Houser

Angelique Hamilton

Midwest Comprehensive Center Staff

Nicol Christie

Dan Botting

Meeting Objectives

1. To vote on remaining recommendation(s)
2. To reach consensus on the Draft Computer Science Education Task Force Report
3. To approve the Final Computer Science Education Task Force Report

Computer Science Task Force Meeting

Mr. Svetlik, chair of the task force, called the meeting to order. Members spent several minutes on introductions and the agenda. Mr. Svetlik noted that there were eight members present, enough for a quorum. (Mr. Weinberg was expected to attend but had not yet arrived.)

Mr. Svetlik noted that the main objective for the day was to review the draft content of the report.

The task force spent several minutes reviewing past meeting minutes, focusing specifically on the highlighted portions.

Mr. Yanek stated that the highlighted portion on page 2 could stand as is.

Mr. Baskin mentioned that the “ACM framework,” reference on page 2 should instead read “K–12 CS framework.” This change was made throughout the document.

Mr. Swikle stated that the highlighted portion on page 3 could be stricken from the minutes as it was clarified during discussion.

Mr. Houser noted that on page 4, it should say “June” instead of “June 12” as that meeting was rescheduled.

Ms. Christie noted that the Midwest Comprehensive Center already had the correction needed for the highlighted text on page 11 and no additional input was needed.

Mr. Svetlik made a motion to approve the May 15 minutes as revised and Mr. Yanek seconded the motion. All were in favor and the meeting minutes were approved as revised.

Mr. Svetlik then directed the task force to revisions of the working draft report on data collection (page 12).

Mr. Weinberg joined the meeting via phone and his attendance was noted by ISBE.

Mr. Weinberg, who worked on a portion of the draft report about state data collection, stated that the revision that he had made to the recommendation was a result of a recent phone call with Mr. Houser and ISBE data analyst where it was decided Illinois would mandate data collection as a part of the state report card. This requirement was created to give faith to the demographic information and track progress toward goals.

Mr. Svetlik noted that he changed the recommended classifications from “gender” to “sex” and from “ethnicity” to “race,” as well as adding free and reduced lunch status on page 12 of the draft report.

Mr. Yanek stated that the task force should maintain uniformity with ISBE, asking if they use “race” and “sex,” or “ethnicity” and “gender?” Or whether it mattered?

Mr. Houser noted that the ISBE utilizes the free and reduced lunches phrase most frequently.

Mr. Baskin noted that the school report card website uses ethnicity/race and gender.

Mr. Svetlik proposed that the task force should stay consistent with that terminology.

Mr. Svetlik made a motion to vote on the recommendation as follows: “Requiring the addition to the Illinois Report Card for each school in the K–12 system of data on courses offered that are designated as aligned to the definition of computer science (CS). These data will include enrollment data disaggregated minimally by gender, ethnicity/race, and free and reduced lunch status, specifically with the demographics of CS course enrollment reflecting each school’s demographics within ten (10) years.”

Mr. Weinberg seconded the motion.

Mr. Houser led a roll call vote and the recommendation was passed unanimously.

Mr. Svetlik directed the task force to the recommendation on state funding, on page 16, stating that essentially the recommendation is to specifically ask for funding. A discussion was held about whether the task force wants recommendations for funding interwoven within other recommendations or as a stand-alone piece.

Mr. Svetlik opened the topic to discussion and asked if there were any concerns about funding being a separate bullet point.

Mr. Betz stated that by submitting a funding recommendations as a separate item, the general assembly may accept other items but not funding, which would result in a mandate that is unfunded and requires schools to divert money from other sources.

Mr. Svetlik mentioned that the recommendations are meant to be based on research and it will be up to the general assembly to decide what to do with them.

Mr. Yanek asked for clarification on whether the recommendation will be voted on by the general assembly as a resolution or a law.

Mr. Houser responded by stating that these are purely recommendations from experts in CS education to allow the general assembly to make decisions. He noted that any number of the recommendations may be taken and put into rules/laws. He clarified that this report is meant to inform the general assembly about best practices and recommendations.

Mr. Baskin added that more guidance never hurts. Specifically, he identified the need for a principal consultant as well as funding as good topics to include in the report.

Mr. Svetlik mentioned that page 17 recommends that the general assembly work with key stakeholders and nonprofits to make concrete funding recommendations.

Mr. Svetlik asked if the task force wanted to call a vote.

Mr. Yanek asked for clarification on the vote, stating that the task force had three options: strike the funding recommendation and try to put a price tag on the other recommendations; keep the recommendation and try to put a price tag on the other recommendations; or keep the recommendation only as a signal that funding will be needed.

Mr. Svetlik responded that the task force doesn't have time to go back and find the data to create price tags for each recommendation.

Mr. Baskin noted that the task force could do some quick calculations. For instance, training CS teachers would cost approximately \$4.3 million over 3 years based on the statistics already available on the percentage of schools with CS teachers already and the average cost of training existing teachers in CS for the schools without them.

Mr. Weinberg stated that he was in agreement with leaving the report as is.

Mr. Svetlik stated that the level of specificity needed to make recommendations on funding isn't available given the time constraints. In regard to Mr. Yanek's question, the task force will look at adding a call for funding to each recommendation, leaving the current vote to focus on keeping or striking the recommendation.

Mr. Svetlik made a motion to adopt the recommendation in the final paragraph of page 16 as written.

Mr. Betz seconded the motion.

Mr. Houser led a roll call with all "ayes."

Mr. Svetlik stated that the motion passed and the recommendation was adopted.

Mr. Svetlik directed the task force to page 12 on ethics in CS education, stating that the rationale behind the recommendation was forwarded by Mr. Houser the day before.

Mr. Swikle summarized his rationale, stating that ethics cannot be compelled, but good teachers can influence students' perceptions of ethical choices. They can nurture the motivation of students in a way that guides them beyond self-serving interests toward decision making that prioritizes community welfare and recognizes the good and right thing to do. In computer science, the skills students learn can be used for good or bad, and thus ethical awareness must be infused in the computer science classroom and be as important as the competencies developed.

Mr. Swikle noted that ethics is likely already in the curriculum, but the recommendation would serve as a reminder of the importance of ethical training in the CS curriculum while allowing schools leeway to create ethical curricula to fit their needs.

Mr. Weinberg agreed that the recommendation should be in the report, but worried about the wording as there are many different types of ethics, including ethical use of computers, ethics of advertising technology, ethics of development, etc.

Mr. Swikle agreed that the wording probably could be improved.

Mr. Baskin noted that ethics is a huge part of computing and is actually included as a separate practice in the K–12 CS framework. One way to make sure ethics is included is to highlight that the K–12 CS framework definition includes ethics.

Mr. Swikle thought that was a good addition, but ethics needs its own bullet point to emphasize the priority it has.

Mr. Svetlik offered a potential replacement for verbiage: “The ethical implications of K–12 CS education, as defined by the K–12 CS framework, be adopted as a pervasive thread in all courses that are identified as CS courses.” He noted this makes it a separate bullet point while still adhering to the framework.

Mr. Swikle stated that the language is very educational-oriented and that the average citizen won't understand it.

Mr. Svetlik responded that some of the computer science jargon and technical language may not be easily understood by a layperson. However the task force needs to remain mindful of the K-12 CS Framework that served as the foundation for many of the task force recommendations and are geared toward the industry of computer science.

Mr. Swikle responded that there needs to be something more with a focus on how CS knowledge is going to be used.

Mr. Svetlik pushed back, quoting a [specific article](#) from the Harvard Business Review (HBR), “ethics also deserve more attention at every educational level. AI technologies face ethical dilemmas all the time. For example, how to exclude racial, ethnic, and gender prejudices from automated decisions...we need people and programmers who can make well-thought out contributions to those problems.”

Mr. Svetlik concluded that Mr. Swikle’s work is good and he clearly put in lots of effort, but the task force needs to not only focus on how CS knowledge is used, but how it is created.

Mr. Yanek stated that his first thought on ethics in CS is teaching students how to behave when using computers and technology and the importance of protection of privacy. He also understands the need to include the ethics of product development and software piracy.

Mr. Swikle responded in agreement that the issues of application and consumption are so important that they should be included in the definition of computer science. There are too many ethical issues to be covered there alone.

Mr. Svetlik proposed new verbiage: “As recognized within the K–12 CS framework, the ethics of software and hardware production and consumption should be interwoven into all K–12 CS courses”.

Mr. Weinberg liked the idea as the ethics of using and consuming technology should be taught to our kids, but note that what it seems to be missing is the ethics of the computer science professionals.

Ms. Wilkerson agreed that Mr. Svetlik’s proposed revision of the recommendation originally crafted by Mr. Swikle about the "production" end of computer science better encapsulated what the task force had been discussing. She noted that it’s easy to assume consumption (piracy, etc.), but the task force responsibility is to also address the ethics of development.

Mr. Yanek stated that he still wants some inclusion of ethical behavior (e.g., digital citizenship, no death threats, no bullying, no inappropriate images, etc.).

Mr. Svetlik noted that digital citizenship is called out right before this bullet as a component of what CS is built on.

Mr. Baskin mentioned that there’s a risk to call out specific aspects of CS in the task force recommendations because there would be a need to justify each specific aspect and it changes the focus. He argued that the task force does not need ethics as its own bullet because it is built into CS.

Mr. Swikle stated that he thought Mr. Svetlik's proposal seemed too impersonal and requested a few moments to make revisions.

Mr. Svetlik responded that there was, unfortunately, no time to do so as the task force was at the point of voting to approve the report.

Mr. Svetlik asked a logistics question and then put the item to a vote. He asked if the task force adopted a recommendation of ethics, knowing that the verbiage needed to change, how would that play out with the approval of the final report?

Mr. Houser responded that the task force needed to make all final decision regarding the content of the report today. He stated that it will not hurt to have ethics included as part of a recommendation.

To address Mr. Swikle’s concerns, Mr. Svetlik then made a motion to adopt as a separate bullet point the following: “The ethics of software and hardware production and consumption should be interwoven into all K–12 CS courses, as recognized within the K–12 CS framework.”

Mr. Swikle shared concerns about the terms “ethics of software and hardware.” He stated that it needed to be very clearly aimed at the users of computers, not creators, and asked for time to revise the language.

Mr. Houser suggested that the task force resolve the issue and move to vote due to time constraints to complete report today.

Mr. Swikle proposed a revision to the motion, adding that an ethical awareness of democratic and moral values in CS should be infused as a component of every CS course.

Mr. Svetlik suggested that the task force merge this with the earlier motion.

Mr. Baskin commented that maybe it was too late to add another recommendation. He pointed out that all the other recommendations had much further consideration, and ethics are already interwoven into other parts of the report. Moreover, the task force needed to spend time on the recommendations already fleshed out.

Mr. Baskin made a motion that the task force not include a separate bullet point given the time limitations.

Mr. Yanek and Mr. Weinberg seconded the motion.

Ms. Christie asked to confirm whether there was still a quorum as Mr. Bevis may have had to drop off the conference call.

Mr. Svetlik noted that Mr. Bevis did have to drop off, but there was still a quorum.

Mr. Houser led a roll call vote. Mr. Swikle voted “nay,” Ms. Wilkerson abstained, Mr. Bevis was not present, and the rest of the members present voted “aye.”

Mr. Swikle made a concluding comment that he was extremely disappointed that this report would not include a specific focus on ethics.

Mr. Betz responded that, to be clear, the CS framework includes ethics. Although the report may not explicitly mention it, ethics are included in the curriculum.

Mr. Swikle responded that in this day and age, the word “ethics” should be emphasized.

Mr. Svetlik expressed his feelings that unfortunately, due to time, the task force wasn’t able to do so.

Ms. Christie suggested to Mr. Baskin that the task force consider including Mr. Swikle’s ethics recommendation and supporting rationale as an appendix or addendum to the meeting minutes, as a compromise. Members responded in favor of this suggestion and Mr. Yanek made a motion to include Mr. Swikle's full proposal in the minutes as an appendix.

Mr. Svetlik seconded the motion.

Mr. Houser led a roll call with all “ayes” except Mr. Bevis, who was absent from this point in the meeting until the end.

Mr. Swikle thanked the committee for being patient with him as a lay person who doesn't have a great understanding of CS.

Mr. Yanek expressed his appreciation for Mr. Swikle's passion on this topic. He hoped this was not the last time that the issue would be discussed and stated that Mr. Swikle’s thoughts and ideas would be included in the minutes and brought up again in the future.

Mr. Svetlik moved the discussion to reaching consensus on the draft report. He stated that he wrote the report as a call to action and asked if the task force felt okay with the flow of the report. He also asked if there were any concerns about the format of the narrative flowing from case to findings to summary of recommendations to expanded content supporting each recommendation.

Mr. Baskin suggested moving the executive summary to the front of the report instead of the middle.

Mr. Svetlik agreed. No other comments were made by the task force. Mr. Svetlik stated that the vote on changes could be made in sum at the end instead of individually.

Mr. Svetlik then pointed members to pages 5–8 of the report (the overview) and asked if there was any feedback, specifically on goals for the work.

Ms. Wilkerson commented that she admired the inclusion of goals of the task force.

Mr. Houser clarified that feedback could be an addition, deletion, or revision.

Mr. Svetlik asked if there were any hyperlink issues as he had experienced some earlier.

There were no comments on this section of the report by the task force.

Mr. Svetlik asked again if there were any changes required.

The task force spent a few minutes reading through the rest of the document.

Mr. Baskin asked if all of the statistics and other information had been double checked.

Mr. Svetlik responded that the grammar would be checked heavily by the Midwest Comprehensive Center.

Mr. Baskin commented that on page 6, in the middle paragraph, there were statements such as “less than approximately 2%, greater than approximately 11%, just over 21%.” He wondered if the task force could give the specific numbers.

Mr. Svetlik thought this was a good idea and noted that 1.8% were Black.

Mr. Baskin responded that the report could change 1.8% to “less than 2%.”

Mr. Betz commented that the report should be consistent by including one decimal place as seen in the statistics related to Illinois as a whole, which were 14.5% and 15.6%.

Mr. Svetlik found that the exact rate on page 6 was 21.1% female.

Mr. Yanek found that the percent of Hispanic test takers was 11.2%.

Mr. Svetlik directed the team’s attention to the footnote on data limitations and the team agreed it should be included.

Mr. Svetlik stated that all the data referenced by Mr. Baskin were pulled from a combination of non-for-profit, such as the College Board, and governmental agencies sources, so he was comfortable using them.

Mr. Baskin replied that the numbers are updated monthly, so the report could include what month the data were from to avoid issues down the road.

Mr. Yanek suggested the report state \$1.8 billion instead of the full number.

Mr. Svetlik agreed as that sounded more impactful and less reliant on specific figures. He also agreed that the month the data were pulled should be included.

Mr. Baskin suggested mentioning that the data come from the Conference Board, another not for profit agency, for proof of reliability and Mr. Svetlik agreed.

Mr. Svetlik asked if there was anything else; there were no comments from the task force.

Mr. Svetlik moved the discussion to the executive summary (pages 9–10).

Mr. Houser asked if the hyperlinks would be included in an appendix for works cited for the paper versions of the report.

Ms. Christie agreed this was a good idea and said she would check with the editors at American Institutes for Research to be sure it gets done.

Mr. Svetlik asked if anyone had changes to any of the findings.

Mr. Yanek suggested a change for the second bullet point to: “offerings by course code, such as distinguishing between CS from career...”

Mr. Svetlik agreed with the change.

Ms. Wilkerson suggested a change for the third bullet. Specifically, she asked if the report should also include that there were no definitions provided for the content within the courses offered.

Mr. Svetlik agreed and revised the text to read, “specifically offer students CS courses without strong evidence of CS course content taught therein, as such data are self-reported at the district level.”

Mr. Baskin commented that the fourth bullet used unnecessarily strong language and that it may need to be toned down.

Mr. Svetlik agreed and Mr. Baskin suggested a change such as: "While Illinois should be applauded for being one of the only states in the country to have an official endorsement for CS, the current requirements create an unnecessary barrier to providing students access to high-quality CS education." He thought this language could replace the first sentence.

Mr. Svetlik agreed that this language fit better with the recommendation as it has a more positive tone. However, he noted that Representative Fortner, one of the co-sponsors of the legislation leading to the formation of this task force, wanted it to be clear to the general assembly what the problems were in the findings. Therefore, the order should be reversed: “Illinois’ licensure system creates an unnecessary barrier to providing students access to high-quality CS education, even while it’s among the leaders as one of the only states in the country to have an official endorsement for CS.”

Mr. Svetlik then asked if there was anyone on the call who was a citizen interested in making public comment and Mr. Houser expanded that to include callers from Chicago or Springfield. There were none.

Mr. Svetlik then moved the conversation to the Summary of Recommendations.

Mr. Yanek suggested that the report replace “secondary” with “high school” as not everyone may know that “secondary” means “high school.” Mr. Svetlik agreed and also suggested adding a parenthetical, such as “(secondary).” He stated this change would not require a vote as only major content pieces do.

Mr. Svetlik asked if there were any other thoughts or comments; the task force had no further comments.

Mr. Svetlik moved the discussion to the expanded description of recommendations.

For the first bullet point, Mr. Baskin suggested adding a couple paragraphs on funding if the task force would like to include them. He read each funding item for the rest of the members.

Mr. Svetlik responded that he would like to note in the minutes that Mr. Baskin does a great job multitasking and Mr. Svetlik appreciates the work he does. He agreed that these new paragraphs on funding should be included after the second paragraph.

Mr. Baskin shared the revised paragraphs with Ms. Christie for inclusion in the final report.

Regarding the second bullet, Mr. Svetlik noted there had already been extensive conversation.

Ms. Wilkerson suggested that the fourth bullet point within this recommendation be struck.

Mr. Svetlik agreed and asked the rest of the team for their opinion. Mr. Betz agreed and there were no other comments.

Under bullet point three (bullet on ethics was already stricken from the report), Mr. Svetlik noted that the team already discussed the bullet.

Mr. Houser reiterated the changes that had been made earlier and Mr. Svetlik stated that there would need to be changes throughout the document to stay consistent.

Mr. Svetlik liked the immediate, medium, long-term structure of the fourth bullet and gave credit to Mr. Baskin and his team for drafting it.

Under bullet point five, Mr. Svetlik noted the required change from “secondary” to “high school (secondary).”

Mr. Svetlik stated that he felt strongly about keeping the phrasing at the start of bullet point six about not taking away current funding.

The team gave audible consensus.

Mr. Svetlik then mentioned he included the reference to Every Student Succeeds Act (ESSA) monies as it was in the [State of the States Landscape report](#).

Mr. Svetlik asked if there were any objections and Ms. Wilkerson responded that she had none; no other members objected or responded.

Mr. Svetlik suggested a change to bullet point seven to include the clause about the advisory group forming and meeting on an annual basis from a prior draft.

There were no concerns about bullet point eight.

Mr. Svetlik stated that what remained was introducing the portion about the advisory group in bullet point seven and closing commentary. He asked if that needed to be done at the time.

Mr. Houser stated that the task force could vote to allow Mr. Svetlik to draft this language at a later date.

Mr. Svetlik asked that members who felt closing commentary was necessary for the report to let him know.

Ms. Christie suggested that everyone provide final comments and to be incorporated into a closing summary in the report.

Mr. Weinberg declined closing commentary and stated that it would require another vote at another time if they did so.

Mr. Svetlik agreed that he didn't think it was necessary for members to provide closing thoughts and asked if anyone had objections. There were none.

Mr. Svetlik made a motion for a roll call vote to adopt the report as revised to be the final report of recommendations to be submitted to the governor and general assembly.

Mr. Betz seconded the motion.

Mr. Houser led a roll call. All responded with "ayes" except Mr. Bevis, who was not present at the time.

Mr. Svetlik stated that the report was now final.

All clapped.

Mr. Svetlik stated that members needed to approve the minutes from the previous meeting. He stated that the task force could delegate responsibility to him or they could meet again to have a roll call vote.

There was unanimous agreement that Mr. Svetlik would have the responsibility for approving the final June 9 minutes.

Mr. Svetlik made a motion to give himself responsibility to approve the final meeting minutes.

Mr. Weinberg seconded the motion.

Mr. Houser led a roll call. All responded with “ayes” except Mr. Bevis, who was no longer present.

Mr. Svetlik wanted to give a shout-out on the record to Mr. Houser and Ms. Christie and their staff for their work.

All clapped.

Ms. Christie reminded Mr. Svetlik about a final charge that he intended to share with members to be “the squeaky wheel.”

Mr. Svetlik thanked Ms. Christie and stated that the members of the task force should reach out to their professional and social network about this report as well as its significance. He stated that the goal was making decision makers aware of the report so that it can be adopted and help improve Illinois' economy and meet the needs of all students, not just those privileged by the accident of where they were born and/or attend school, with the opportunity to take CS.

Mr. Houser, on behalf of the state superintendent, thanked everyone involved in the task force.

Mr. Houser explained the timeline: The report will be revised by the Midwest Comprehensive Center and ISBE and then be put into the hands of the general assembly by July 1st. From there, advocacy is important to move things along.

Mr. Houser also stated that the report would be available on the ISBE website and sent out to the members of the task force upon completion.

Mr. Svetlik gave recognition to Jenna Garcia for the hashtags on the report and suggested that the members use them to start an advocacy campaign.

Mr. Yanek acknowledged Mr. Svetlik for all his hard work and leadership during the last 2 months.

All clapped.

Mr. Svetlik made a motion to adjourn.

Mr. Betz seconded the motion.

All responded with “ayes” except Mr. Bevis, who was absent.

The meeting adjourned at 4:03 pm.

Appendix

TO: SBE Computer Science Task Force Members
FROM: Randy Swikle, Illinois Press Association Representative
DATE: June 8, 2017
RE: Final Report Recommendation/Rationale (Ethics)

Below is a recommendation and rationale for the final report of the Computer Science Task Force.

Instruction to promote an ethical awareness of American democratic and moral values, computer usage issues, and ethical dilemmas and problem-solving strategies should be a component of every computer science course.

Supporting rationale:

RATIONAL FOR ETHICAL AWARENESS TRAINING

I. (“Ethics in Computer Science” by J. Barry DeRoos):

Ethics and values must play a role in computer science education. Simply equipping students with neutral tools and skills, which are to be used purely according to their personal whims and desires, fails to recognize the moral standards and democratic principles of American society. Such recognition helps learners to consider ethical values during application of computer skills. “One can’t guarantee that guidance will be accepted and followed, but it is irresponsible not to offer it.”

- “In the practice of computer science, a person’s moral and ethical values are critical to the relationships developed with fellow workers, the types of applications that are developed, the quality of the work done, and the general honesty and integrity of the person.”
- An ethical component of computer science education would address two possible reasons for illegal use of computers: (1) problems with moral vision of users; (2) rationalization “justifying” illegal activities. (Example: Some people who would not think of shoplifting a book from a bookstore readily make illegal copies of software.)
- “Because software piracy [is] a common behavior of ... students, it [is] an ideal topic to integrate into computer science courses.”
- Example from a college Software Piracy Policy: Because electronic information is volatile and easily reproduced, respect for the work and personal expression of others is especially critical in computer environments. Violations of authorial integrity, including plagiarism, invasion of privacy, unauthorized access, and trade secret and copyright violations constitute grounds for sanctions against members of the college community. Students should be aware of legal consequences that may accompany ethical deficiencies.

II. (“Ethical Problems in Computing” from Association of Information Technology Professionals):

- The dynamic nature of computer science education requires perpetual consideration of ethical principles. Because of its constantly changing nature, the area of computer technology is one that is difficult to assign a specific set of moral codes, although it is necessary that ethics be considered when making decisions in this area. Computing creates a whole new set of ethical problems, unique unto itself. Among such problems: (1) the unauthorized use of hardware; (2) the theft of software, (3) disputed rights to products, (4) the use of computers to commit fraud; (5) the phenomenon of hacking and data theft; (6) sabotage in the form of viruses; (7) responsibility for the reliability of output; (8) making false claims for computers; and (9) the degradation of work.
- By integrating ethical awareness in computer science courses, students can address such ethical questions as: (1) Is copying software really a form of stealing? (2) Are so-called “victimless” crimes . . . more acceptable than crimes with human victims? (3) Does information on individuals stored in a computer constitute an intolerable invasion of privacy? Such questions demand that ethical principles be applied to their resolution because without the consideration of ethics, these gray areas can easily become completely black. Other topics posing ethical problems include unauthorized computer entry, computer privacy, and the power that computer professionals wield because of their knowledge of computer systems.

III. (“Ethics of Technology” from Wikipedia)

- It is often held that technology itself is incapable of possessing moral or ethical qualities, since “technology” is merely tool making. But many now believe that each piece of technology is endowed with and radiating ethical commitments all the time, given to it by those who made it, and those who decided how it must be made and used. Whether merely a lifeless, amoral “tool” or a solidified embodiment of human values, “ethics of technology” refers to two basic subdivisions:

(1) The ethics involved in the development of new technology—whether it is always, never, or contextually right or wrong to invent and implement a technological innovation.

(2) The ethical questions that are exacerbated by the ways in which technology extends or curtails the power of individuals—how standard ethical questions are changed by the new powers.

In the former case, ethics of such things as computer security and computer viruses asks whether the very act of innovation is an ethically right or wrong act. Similarly, does a scientist have an ethical obligation to produce or fail to produce a nuclear weapon? What are the ethical questions surrounding the production of technologies that waste or conserve energy and resources? What are the ethical questions surrounding the production of new manufacturing processes that might inhibit employment, or might inflict suffering in the third world?

In the latter case, the ethics of technology quickly break down into the ethics of various human endeavors as they are altered by new technologies. For example, bioethics is now largely consumed with questions that have been exacerbated by the new, life-preserving technologies, new cloning technologies, and new technologies for implantation. In law, the right of privacy is being continually attenuated by the emergence of new forms of surveillance and anonymity. The

old ethical questions of privacy and free speech are given new shape and urgency in an Internet age. Such tracing devices like RFID, biometric analysis and identification, and genetic screening all take old ethical questions and amplify their significance.

III. (Additional Rationale)

- “In an objective system ... any mingling of knowledge with values is unlawful, forbidden. But [the] ... ‘first commandment’ which ensures the foundation of objective knowledge, is not itself objective. It cannot be objective: it is an ethical guideline, a rule for conduct. True knowledge is ignorant of values, but it cannot be grounded elsewhere than upon a value judgment ...”
— Jacques Monod (In “Chance and Necessity” 1970)

- “The potential for abuse presents a formidable but vital task for schools, because they cannot just teach computer literacy; they must teach computer ethics.”
—Ken Komoski, executive director of Educational Products Information Exchange

In the end, a person’s ethical beliefs cannot be compelled. But good teachers beneficially can influence a student’s perception of ethical choices. They can inspire a clearer awareness and understanding of society’s values, of moral principles and of ethical issues and dilemmas. They can help nurture the intrinsic motivation of students in ways that guide them beyond self-serving interests toward decision making that prioritizes community welfare and recognizes the good and right thing to do.

The skills students learn in their computer science education can be used as a magnanimous wand or as a harmful weapon. Selfless, or selfish? Which motivation will prevail?

The inclination of computer science learners is as important as the competencies they are developing. That may be the most profound reason why ethical awareness must be infused in the computer science curriculum and nurtured in every classroom.