

THE CO-OP STUDENT

I

Project leader Bruce Barton was being sorely pressed to complete the development of several engineering prototypes for a field test of a new appliance model for the XYZ company. One particular plastic component of the new model had given difficulty in laboratory tests as it failed repeatedly before reaching the stress level necessary for successful operation. Bruce had directed a redesign of the component using a tough new engineering plastic recommended by the Research Laboratory's Material Science Department. Stress tests needed to be run on the redesigned component, but Bruce was running short of time and needed to get on with building the prototype.

Bruce sought out the manager of the Material Science Department for help in running stress tests on samples of the new component. With this assistance he could go ahead with prototype building and conduct the tests concurrently. The prototypes, of course, would not be released to field test until the stress tests on the redesigned component proved its design to be satisfactory.

Tom Mason, manager of the Material Science Department, was willing to assist because he knew how critical completion of the development was to XYZ's future appliance plans. However, this was also a busy time for Tom's department. So, Tom suggested to Bruce that he could assign the test work to one of the engineering co-op students. Tom was also coordinator of engineering co-op students, and he liked to use the co-op students in demanding situations to give them practical experience.

Tom assigned the test work to Jack Jacobs, an engineering co-op student from the State University who was completing his second work session at XYZ. Jack was familiar with the test equipment and previously had done similar test work. Jack was a good student and his co-op work had been usually well done. Tom commented to Jack that he would need to work diligently to complete the tests before he had to return to State University.

Jack completed the tests on schedule and turned in a report to Tom indicating the component had successfully passed the stress tests. Upon completion of the test report Jack returned to the university for his next school session. Tom gave Bruce the good news. The prototypes were completed and the field test of these prototypes got underway on schedule.

A few weeks later, Bruce rushed into Tom's office to tell him that most of the prototypes were out of operation because of a catastrophic failure of the component that had been tested in Tom's lab. Bruce wanted to discuss the test immediately with Jack; but since Jack had already returned to the university, he and Tom settled for studying Jack's lab notebook in detail.

After review Tom said, "Bruce, I hate to say it but these data look **too good**. I know the equipment and there should be more scatter in the measurements Jack took. I think some, if not all, these measurements are in error or they have been faked! At best, Jack probably took a few points and 'extrapolated' the rest!"

What ethical issues, if any, does this scenario raise?

II

Bruce and Tom made plans to run all the tests again. Meanwhile, Tom phoned Dr. Frank Thompson, Co-op

Coordinator at State University, to discuss his fear that Jack had falsified data. In the course of the conversation he asked Dr. Thompson if any effort was made to discuss professional ethics with co-op students before their first work session and if the importance and value of engineering test results were stressed to these students. Dr. Thompson explained that no specific instruction on professional ethics was given to co-op students, but all lab courses emphasized the need for accuracy in data taking. Dr. Thompson added that he found it hard to believe that a co-op student would "fake" data!

Was it appropriate for Tom to discuss his concerns about Jack with the university's Co-op Coordinator **prior** to discussing the matter with Jack?

Should Tom have a conversation with Jack about his concerns? If so, what type of conversation should Tom have with Jack when he talks with him? Should he refuse to have Jack return to XYZ as a co-op student?

III

What comments would you make about the supervision given co-op students at XYZ?

IV

Should State University incorporate into its instruction program some emphasis on professional ethics? If so, what form might this take? If not, why not?

[This case was originally prepared by Dr. Gale Cutler, a management consultant in St. Joseph, Michigan. It was published in Research Technology Management, May/June, 1988, p. 50.]

COMMENTARIES

W. Gale Cutler

The aspect of this case that should produce the most concern is the apparent and immediate conclusion by Tom that Jack "faked" data without any concern about the results of his action. This is equivalent to a "guilty until proven innocent" approach to justice. The first action taken by Tom when he learned that the results of the stress test were suspect should have been to bring Jack into the discussion, either by telephone or, in view of the seriousness of the situation, by paying Jack's expenses to return to the laboratory to discuss the tests. If Jack has a valid explanation for the results he obtained, the failure to bring this explanation into consideration could place an irreparable blight on Jack's career because of the hasty accusation. This contact with Jack should also have occurred before the University co-op coordinator was contacted with the fear that Jack had falsified data.

However, in terms of proper management of co-op students it is unthinkable that the important tests such as Jack was running were not closely supervised and the results checked periodically. Such supervision is the essence of good laboratory management and in no way displays a lack of trust in Jack (or any other employee so supervised). At the very least, Jack's test results should have been carefully reviewed before he departed for college. Certainly we have reason here to question the proficiency of laboratory management in the Material Science Department at XYZ.

To judge Jack's behavior we also need to know exactly what his instructions were when assigned to do the tests. Was he told how critical the tests were? Or was he led to assume the tests were merely routine? Did his supervisor say quickly, "I need this part qualified by the end of the week?" If that's what Jack heard he could

have interpreted the directions as "hurry and run some tests but the part is going into production anyhow."

In research and development situations we must always take the time to explain all of the "why" of the problem when we delegate a task. Analytical test work, in which the answer depends particularly on the question asked and how it is asked, demands an especially careful statement of the problem.

If in subsequent conversation with Jack he confesses to falsifying data he should be severely reprimanded and probably XYZ (unless extenuating circumstances are revealed) should terminate its co-op relationship with Jack. In the reprimanding (and terminating) procedure, Jack must be reminded of the responsibility of an engineer. To quote the National Society of Professional Engineers Code of Ethics:

Engineering is an important and learned profession. The members of the profession recognize that their work has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honest, impartiality, fairness and equity, and must be dedicated to the public health, safety and welfare. In the practice of their profession, engineers must perform under a standard of professional behavior which requires adherence to the highest principles of ethical conduct....

There is a growing and encouraging trend to incorporate the teaching of ethics into the engineering curriculum. This incorporation is being done best in the form of case studies in engineering courses so that the student has an opportunity to combine the study of both the technical and ethical considerations of engineering problems. Such instruction brings home to the engineering student the responsibilities of the engineering profession and the personal obligations of members of the profession. Responsible people accept moral responsibility for their actions!

John B. Dilworth

Did co-op student Jack Jacobs falsify the test data? Let us assume that he did, to keep the case ethically interesting. Then we can quickly agree that he should not have done it, and that he should be approached to find out why he did it. Also, clearly there is a need for much more stringent monitoring of co-op students, given that one of those in whom the supervisors had the highest confidence nevertheless betrayed it.

The most pressing question above concerns why he did it. Not, I hasten to add, as a question about Jack's individual psychology, but rather as a question about his social and scientific attitudes insofar as these were molded by his education. We need to discover what was missing in his training, or what was present yet in some very inadequate form, which resulted in him being able to do such a thing. Or, to put the matter in another way, what factors should we emphasize more in education, in order to effectively prevent students such as Jack from falsifying data in future?

The case queries us as to whether material on professional ethics should be included in student education. This should certainly be of some help in cutting down on the amount of data falsification, plagiarism, and other unethical practices. However, ethics by its very nature has two separable aspects or sides, a theoretical and a practical side. The theoretical side concerns ethical knowledge and truth. The practical side concerns personal motivation and commitment to act upon one's ethical beliefs. Unfortunately, an intelligent student could fully understand (or seem to fully understand) and even agree with ethical claims such as that is unethical to falsify data, but still have little or no commitment or motivation to actually live up to such ethical beliefs.

Another way to put this point is that unless the person him/herself is significantly changed by the ethics course (or

in no need of change), the practical goal of preventing data falsification is unlikely to be achieved. Ideally we would ensure that students achieved (or already possessed) a good moral character at school, because merely changing their knowledge and beliefs will not guarantee good behavior or any real commitment to morality.

Is there anything else we can do, in case students fail to acquire or have enough moral character? Fortunately there are still some other fairly powerful motivators, which involve the self-interest of students. Methods based on self-interest are admittedly second-best methods, because students influenced by them do the right things for self-interested rather than specifically moral reasons. Nevertheless, we should not despise any legitimate methods which can help to prevent moral evils such as data falsification.

'Self-interest' methods can be divided, as in the traditional fable about a donkey, into 'carrot' and 'stick' approaches. A donkey can be encouraged to move forward by hope for the reward of a carrot, while a stick is available to punish any refusal to move forward. Similarly, in the present case we can convince students that there will be rewards for them if they behave as good scientists should, while on the other hand there will be punishments if they do not behave correctly.

On the positive, 'reward' side, one of the more interesting approaches would be to convince students that it is actually in their interest to acquire a good moral character. For example, a good case can be made that if students work on becoming more conscientious, concerned about the truth, etc., they are much more likely to find scientific work satisfying and enjoyable, and much less likely to perceive science as often tedious and pointless.

Other self-interested rewards of science for good individual behavior are more closely linked to potential punishments for bad behavior. For example, the reward of a long, secure career in science is available only to those who avoid certain punishments, such as being dismissed from a post after falsification of data is discovered.

An education which stresses both how attractive a successful scientific career can be, and also how disastrous to one's career even a trivial immoral act might be, has the best chance of ensuring self-interested good behavior from students during their careers. At the same time, we may continue to hope that such 'self-interested' educational methods will become increasingly unnecessary.

Joseph Ellin

I

Co-op student Jack is given an important test to do and produces results that are too good to be believable; evidently he has faked the data. XYZ relies on Jack's results without confirming them and the consequence is that the tested component fails in operation, bringing down the units with it. Apart from the obvious point about faking data, the only ethical issue I see in this case is the questionable decision to assign an important test to a co-op student, and then to accept his results unconfirmed; but given the constraints on time in the department, this seems like a decision within management competence, and doesn't necessarily raise any ethical problem, even if it turns out to have been a mistake. No health or safety problems occur as a result of the units' failure, so the company is harming only itself by its loose supervision. Perhaps co-op student Jack ought to have been supervised more closely (especially in view of the importance of the project), but this too is judgment rather than ethics, and Jack's good record does not indicate supervision is required.

II

Jack's supervisor relates his worry about Jack to Jack's professor. In general, before an accusation is made against someone to a third party, that person ought to be confronted with the charges and have an opportunity to explain himself. However the conversation with Dr. Thompson was presumably strictly confidential, and nothing is said to indicate that the questions asked by Tom were out of line. Tom is unsure of how to proceed and wants to discuss the question with someone who knows Jack better; also, Jack is no longer under Tom's jurisdiction. So if something is to be done, the ball has to be passed to the University. Further Tom's interest seems to be not punitive but correctional, since he puts his inquiries about Tom into a context of ethical training at the University (this could be a smoke screen of course). Since Jack has no current association with XYZ, the company is in the position of a victim of Jack's wrongdoing, not a prosecutor entrusted with dispensing justice. For these reasons, Tom's move in talking to Dr. Thompson seems warranted.

It's not clear what purpose would be served if Tom were to talk to Jack. Jack is now the University's problem. However if Dr. Thompson subsequently talks to Jack, Tom might be called in to produce the dubious data and explain his suspicions. What else happens depends on what comes before. First it's necessary to understand why Jack faked the data (if he did), and to make sure that Jack understands that doing so was wrong. Based on the information in the case, there's no reason to exclude Jack from XYZ in the future, assuming this problem gets cleared up and Jack's future trustworthiness is established, though such a reason might emerge after discussion with him.

III

In hindsight, supervision of students is obviously not too satisfactory. On the other hand, the department was busy and supervising a student whose previous work had been well done might not have seemed the best way to use time. Perhaps all co-op students should be closely supervised as a matter of course; I don't know enough about what they know or what they're supposed to do. Or perhaps Tom's initial response, to suggest that all students take ethics and be made to understand the importance of honest data, is the best solution.

IV

So should State put in an ethics course? Yes. See this case for a reason why.

Henry West

I

If Jack Jacobs, the co-op student, either faked the test results or took a few points and extrapolated the rest, he was taking credit for work without doing it, which is like cheating on a test or plagiarizing a paper. He was also making the company count on work which hadn't been done properly, trusting in something which turned out to be unreliable.

There are other possibilities, however, that shouldn't be discounted. The test may have been carried out properly but be an inadequate test for whether the part can operate under the strain of regular use. The test results may be in error in some other way. Jack may have not run the test properly. Although Jack was familiar with the test equipment and had previously done similar work, he may still have misused it and made honest mistakes. There is only presumptive, not conclusive, evidence that Jack did not run the tests to the best of his ability.

Another issue is whether Jack was getting proper supervision in his work session at XYZ. It is good for co-op

students to get demanding work to give them practical experience, but shouldn't their work be checked, both while doing it and after done, so that they and the company know if they are doing it properly?

II

If Tom had talked with Jack first, what could that have achieved? If Jack falsified the data, he might have lied about it and simply gotten himself into deeper unethical water. And if he did lie, what more would Tom know than he already knew? There would still be presumptive evidence that the results were falsified, but no more proof than before the conversation. On the other hand, if Jack had misused the equipment or had extrapolated from a few tests, that might be found out, and Jack would be known to be guilty of the lesser of the suspected errors. And Jack might not realize that extrapolation from a few tests could have the dire consequences that did in fact occur from passing on materials which would not stand up under complete tests. There would be two reasons, then, for having a conversation with Jack. One would be to find out more about what really happened. The other would be to impress upon Jack the consequences of his poor performance.

But is it Tom's responsibility to get in touch with Jack? Students are hard to reach at the University. Jack may not have a private telephone, and to write a letter hoping for an answer is a slow way of doing something. Furthermore, the case is not just about Jack. It is about preparation of students for co-op work and, ultimately, for their professional work. Tom wants the Co-op Coordinator to be informed that a student probably falsified data or at least extrapolated from a few tests, which is not adequate job performance. The Coordinator should be told, for Jack's performance reflects on the University and its training of its students. Jack's identity would be hard to keep secret, in case Tom wanted to do so; but there isn't any reason to keep it secret. There is evidence that Jack failed to do honest work.

Another question is whose job it is to discipline Jack if he has done dishonest work for XYZ. XYZ could refuse to have him return as a co-op student. It could also write a letter to the coordinator to put into writing the charge. It could inform all the people at XYZ with whom Jack had worked that if he asked for letters of reference, they should be aware of this failing. But ultimately, the University has to be responsible for dealing with Jack's dishonesty. How should it be dealt with by the University? If Jack is getting academic credit for the co-op work, should it be denied? If he deliberately falsified the data, should he be dismissed from the University? What procedure should be used for ascertaining the facts and assigning a penalty? Should this be treated in the same way as a case of cheating on a test or plagiarizing a paper, and by the same procedures? Or is honesty something that the University should leave to society in general and the conscience of the individual?

III

It is easy to say, when something goes wrong, that more supervision is required. Jack was in his second work session at XYZ. He had done similar test work, and his co-op work had been usually well done. Why shouldn't he have been trusted to carry out the tests without supervision? Would the work of a regular employee have been supervised any more closely? Why, then, shouldn't a co-op student with Jack's experience be treated like a regular employee?

IV

There are many areas in which a course in professional ethics might sensitize students to issues that they haven't thought about. But is this one of them? Surely, Jack knew that he should not falsify data. All lab courses emphasize the need for accuracy in data taking. But he might not have been sufficiently sensitive to what the

consequences of short-cuts in testing might be. If that is the issue, and if that is the ethics of the case, then ethical instruction needs to include such sensitivity to consequences, not just rules of honesty and so on.

Insensitivity to real consequences of one's work may also be due to the way lab work is graded. In lab work, the consequences are only a grade. If one knows what the results are supposed to be and gets those results, it may not have any practical consequences that one didn't carry out procedures properly. In lab work, if one makes a mistake in procedures, and they show up in the answers, one gets a poor grade. If one makes a mistake in procedures, but they don't show up in the answers, one may get by with a good grade. So maybe there may be a fault in the way labs are run and lab work is graded.

What might have motivated Jack to falsify the data or to extrapolate from a few tests? Probably it was the time constraint. In order to finish before returning to the University, he didn't have time to run all the tests. So there was a conflict between his self-interest, in wanting to look good by finishing the tests, or in wanting to work less diligently, and the company's interest in having the tests run properly. How can sensitivity to this conflict, and willingness to be responsible in one's work at the expense of some short-term self-indulgence, be taught? Perhaps some role-playing would help. If one student was put in a situation like Jack's and another in the situation of that of supervisor, another in that of coordinator of co-op students, and so on, for this and other situations of conflict of interest, students might come to see things from more than one perspective and develop an awareness that in taking an irresponsible short-cut they are not only taking the risk that they may be caught, which will hurt their future careers; they are letting someone else down. Ethical sensitivity requires awareness of the possible bad consequences of one's action, both for self and others, and willingness to see things from more than an individual point of view.