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# Collaboration between Private Sector and Academia: Are We Compromising Our Engineering Programs?

Rigoberto Chinchilla

Eastern Illinois University, [rchinchilla@eiu.edu](mailto:rchinchilla@eiu.edu)

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## **Collaboration between Private Sector and Academia: Are We Compromising Our Engineering Programs?**

**Dr. Rigoberto Chinchilla, Eastern Illinois University**

Dr. Rigoberto Chinchilla earned his Ph.D. in Integrated Engineering from Ohio University. He is an associate professor of Applied Engineering and Technology at Eastern Illinois University (EIU) since 2004. His teaching and research interests include Quality Design, Biometric and Computer Security, Clean Technologies, Automation and Technology-Ethics. Dr. Chinchilla has been a Fulbright and a United Nations scholar, serves in numerous departmental and university committees at EIU and has been awarded several research grants in his career.

## **Collaboration between Private Sector and Academia: Are We Compromising Our Engineering Programs?**

### Abstract

A central theme in the past ASEE Main Plenary in San Antonio, Texas, was the need to prepare our students for an “effective industrial practice.” Most panelists stressed the fact that “nowadays companies do not want to spend too much in training.” The direct implication at the end of the plenary was that academia was somehow “obligated” to supply engineers with the “right skills” for these companies. With the increased pressure in cost saving, according to the panelists in the plenary, the private sector has suggested that academia has to build a curriculum “ad-hoc” so they can hire “good engineers” for their companies.

However by modifying our curriculum drastically to suit the needs of private sector groups, we might be jeopardizing the long-term gains of our professionals and/or universities in pursuit of possible short-term gains for the companies. Where do we draw the line between the private sector needs and the academic mission? How do we maintain academic integrity in our curriculum without designing programs to satisfy the needs of a group that might not even represent properly the future needs of the country or our students? Is academic freedom and university autonomy in danger of being subordinated to corporate demands? This paper explores some ethical issues many universities might be facing when balancing the traditional mission of the university and the needs of productive sectors of society under new economic pressures.

Our students might strongly support an “ad-hoc” type of curriculum because they might perceive an immediate advantage in getting a job as soon as they graduate. However, they might be losing professional value and career flexibility in the long term, which immediately raises ethical questions that must be addressed. Do we have to keep preparing them with our traditional curriculum or do we have to prepare them for a specific group of companies? Is it possible to do both in a four-year period that is already stressed with too many demands? What does it mean “to be prepared for a job”? Is the mission of the university to be a substitute place for “ad-hoc” training? Is the university a place aimed to save money for the private sector by eliminating training from their costs? This paper proposes solutions like certificate/training-in-partnership with community colleges, in situ certificates, and internships. These proposed solutions might provide a balance for reasonable ethical compromises.

## Introduction

It is more common in professional engineering gatherings, to hear loud voices of many claiming that universities should be looking for a path that supplies engineers with the “right skills” for private companies. These companies claim they can no longer afford the expenses of training their new engineers. This trend suggests somehow that it is the obligation of academia to supply engineers for the private sector demands and that academia might be doing “something very wrong” by not going along with this suggestion. In their view, academia has to organize its curriculum around a philosophy that sees college as part of a production chain. This view promotes a monetary gain centered curriculum design based on the needs of particular groups who just want to save money. What is remarkable is that a significant amount of those loud voices come from inside academia and especially from many professors who seem not to think twice about their commitment to this philosophy. This argument coincides with deeper cuts in universities’ budgets. Universities are trying to compensate these cuts by increasing funding from private groups willing to “help academia to achieve its goals” being the private sector, claiming an “ad-hoc” education.

The loud calls to align industry and businesses with academia seem to be reasonable based on economic constraints on both sides and the fact that “our students will benefit from it.” Another strong argument in favor of the social benefit of the alignment of business’s needs, and college curriculum is the fact that our worldwide competitiveness will improve. According to this view, the U.S. will better compete in the global market once universities understand they have to be committed to the necessary curriculum changes in order to save the industrial competitiveness of our country. The above sound arguments certainly put political and economic pressures on colleges and universities by making them one of the targets in our worldwide competitiveness problems. The basic economic term in this pursuit is “to add value” to our graduates and our programs; however, there are no formal studies weighing if critical thinking and standards of academic excellence will be severely affected or will play a secondary role under this proposed alignment. The competitiveness variable in the equation, however, is mostly weighed based on financial considerations; companies will save money in reduced training and they might provide money to academia in the process. Within this philosophy, at some point research done in academia might not be left to the professor’s will, but based mostly on private sector needs. This might put pressure on professors who might be seen as citizens not willing to contribute to “America’s future.”

Certainly, it can be assumed that very few professors and university administrators might want to “defraud America” and very few do not want to help a key partner like private companies around our economic and production environment. Nonetheless, ethical questions immediately arise in this proposition. There is no clear study yet showing where to draw the line between the need of qualified personnel from the private sector reflected in our curriculum design and the need to develop pure critical thinking skills and general abilities in engineering and technology. More than that, there is no study of how the corporate demands might affect the academic freedom of our instructors. At what point does teaching based on specific corporate demands compromise the need to teach general skills that can be used at *any* company with proper training? How do we know if the skills we are teaching based on corporate demands are the set of skills these students will need if they move out of the state, the country or if they

decide to work for a different set of companies? Would it not be better to keep our education with a strong component of general engineering and critical thinking skills and let the private sector train them in particular applications? (As it used to be!) Are the expected short-term gains of the “ad-hoc” curriculum a trap that will bury us in the long term?

There is no doubt that many of our students will support the new proposed “alignment” because they might perceive an advantage in getting a job as soon as they graduate; however, they might be losing more professional value and career flexibility in the long term. Our students might not see the long term implications when confronted with an immediate job opening. Do we have to prepare them for the “learn to learn” path? Or do we have to prepare them for a specific group of companies? Is it possible to do both in a four-year period that is already stressed with too many demands? What does it mean “to be prepared for a job”? Is the mission of the university to be a substitute place for training or to save money for the private sector by removing training from their costs?

### The Market Model of Education

According to Woodhouse, citing Mitchel<sup>1</sup>, there are five assumptions of Market Modeled Education (MME):

- “The Prime function of the universities are to meet the ‘the critical need for skilled human resources and relevant research’ capable of producing ‘prime outputs’ for the corporate market.”
- “Vocational training is to become the core educational function of universities. Prime outputs now consists of “key manpower [sic]” capable of adding value to corporate revenues through the application of sophisticated scientific and market knowledge.”
- “In order for research to be geared to the market and its findings made into products to the process of ‘technology development’ the kind of expertise offered by ‘research and science parks’ is required. Patents for such products increasingly and exclusively accrue to business corporations because they have the money resources to turn such research into more money or value added.”
- “Entering into numerous businesses “partnerships” in this way ensures that the universities remain instruments of monetized economic growth.”
- “The institutional autonomy and academic freedom, which have enabled universities and faculty to advance learning and disseminate knowledge as a public good in itself , is correspondingly selected against and abolished”<sup>1</sup>

The MME might describe in many ways how a sector of professionals within academia and private companies might want to drive the university mission. There is little doubt among professors that having the input of the private sector is a valuable tool for designing our curriculum. Also, there is little doubt that research shared between the private sector and academia can give valuable input knowledge and skills needed to fine tune our research plans. Overall industry input might give academia solid ideas about future research and curriculum paths. However, this symbiotic collaborative partnership, wrongly managed, might severely shift to pure economic interests if the model outlined above is fully implemented, unless we carefully understand the long term consequences of adopting it and find a balanced solution. The

particular interest of the private sector should never be the main universities' mission driver. It is not difficult to envision the potential dangerous consequences of subordinating our curriculum mainly to private sector needs. If this happens, universities might become simple machines in a line of production; however well-planned and thoroughly discussed partnerships might not be dangerous to the university mission. To subordinate the whole university mission, to purely market needs is intuitively and ethically wrong, if we believe the university mission is to democratize knowledge impartially for the people in a way that the people's critical thinking and general education is the priority. Businesses' priorities and needs might not be always in line with the general mission of the university. In general, the goals and results of superior education are not immediately quantifiable. It may take a few years to evaluate the results of changes made in the curriculum if the MME is implemented. It is therefore impossible to predict with certainty if the MME will damage critical thinking skills, other expected educational skill, or will improve the productivity of the companies or the country.

No less important in this discussion is to explore how the autonomy of the universities might be affected by the MME. As a very general example, how long colleges of fine arts offering ballet, painting and similar majors will be supported properly when these careers do not fit or might not be perceived as part of a model that does not add monetary value to the production chain? How much engineering courses should be modified to satisfy the demands of the "production line" to the point at which teaching key general skills might be compromised? Can companies have such power to dictate what should be taught and what shouldn't? The problem might become significant due to the economic crisis American universities are experiencing. Many universities might begin to be shaped internally as driven by market value even without the influence of the previous ideas as a consequence of their lack of governmental support. It is not difficult to envision university authorities promoting and prioritizing (by means of internal grants or public recognition, for example) certain lines of research that might give the university more money than others. As professors, if we need to earn grants in order to sustain our careers, we might be tempted to shift our original research interest with the objective of obtaining grants driven by the university administration's economic interest. According to Woodhouse, "The goals of education and the goals of the market are based on wholly distinct and often opposed logics of value, one enables deeper and broader understanding of reality, while the other maximizes corporate stockholder value."<sup>1</sup>

### Consequences for Students

Many of us may have defined an ideal education during or before graduation, as the one which will maximize the chances of getting a job as soon as we graduate. This definition might be sound, and we can infer that many students might always support such a definition. The students' pressure to pay back their education loans and be self-sufficient as soon as possible might not suit well our criticism of a MME. However, if the educational curriculum has been tailored to fit the skills needed by groups of interest, their education might make them professionally dependent on these groups for a long term in their careers. Ethically, we might question the value of an education that might create such a long professional dependency because it restrains students' freedom to move to other future potential interests in their careers and to better adapt to any future industrial, commercial or even academic environment (i.e. Masters or PhD degrees). To limit their general options or critical thinking skills to benefit

specific groups is ethically and morally wrong. We have, therefore, as educators, to resist pressures to severely change our syllabi and our curriculum design for short-term gains of any special interest group and never compromise the students' academic and market flexibility. It is our obligation not only to explain to them and our university administrators the rationale for our curriculum design, but to find a solution that might suit most of the needs of all interested parties. If one of the goals of the university is to satisfy the "need of their customers", as students are, it might be also argued that it is unethical to take their money to prepare them with courses that are perceived as not "the best ones" to obtain a job immediately. This might be true if academia is conceived only as part of a production line of professionals to meet the needs of the market. However, it might be equally or more "unethical" to try to limit their professional possibilities, their intellectual growth, their ability to use knowledge creatively, and the flexibility to work in the market by "boxing" them into particular group demands.

### Consequences for Professors

Professors do research using internal and external grants and then publish their findings as requirements to maintain their jobs and/or to be promoted. We can't negate the positive correlation between the amount of money professors obtain from grants and the chance to make quality research and to publish in quality journals. The more money professors get continuously, the more they can keep producing knowledge and the more recognition they might obtain in their academic communities. If research is mostly subordinated to the needs of the "market model of education" and if our universities are more in line with this model, there is highly possible that professors also will become part of the MME system. As professors, then, we will become just mere agents of a chain of production driving our research mostly to certain "relevant subjects" (The ones supported by the MME) and will indirectly penalize professors wanting to research subjects "not relevant" to the model.

The argument in this paper is not in favor of pure curiosity-driven research at the core of academia; however, academic-freedom should be able to support these initiatives as well as those driven by commercial interest. There is also little doubt that research typically drives the content of university courses reflected in the final papers, projects, and daily lectures. It is not difficult to imagine that if our research funds become mostly or exclusively from interested parties in the MME then, the content of our courses might sooner or later, begin to reflect those alignments. The "true stars" in academia will be those who better serve the market demands. This immediately raises serious ethical questions because many professors not wanting to do special interest research might be in disadvantage. In the end, academic freedom might be the most important loss of all.

### Consequences for Universities

We have already discussed the potential losses in academic freedom and autonomy if universities adopt the MME blindly. In addition universities, as any other institution offering services, might feel the pressure to compete with other universities which "successfully" have adopted the MME approach in their curricula. Under the assumption that students know which curriculum (or which university) will give them more "marketable value," it is not difficult to imagine that a vast majority might prefer to "invest" their money in a university that will position

them immediately in the market. In the long term, this might severely affect enrollment in universities preaching the mantra of “critical thinking and democratized education for all.” Students might not choose the better long-term option. If most students choose the MME path, in a few years many universities might feel the pressure to close or reduce services due to lack of enrollment just by keeping the traditional model of education.

Indeed the argument that universities should teach careers with the only objective being to position their students in well-paying jobs, is already creating problems in the liberal arts courses and in prestigious universities like UNC at Chapel-Hill, where recent elected Governor Pat McCrory said “I think some of the educational elite have taken over our education where we are offering courses that have no chance of getting people jobs,” adding “we have to draft legislation that would change how much state money universities and community colleges receive not based on how many butts in seats but how many of those butts can get jobs.”<sup>2</sup> According to Jen Job of the MoveOn.org<sup>3</sup>: “Liberal arts courses don't \*train\* students, they \*educate\* them, preparing them to think critically, adapt to new situations, communicate effectively, and innovate--all skills the next generation needs in this ever-changing economy. McCrory himself has a liberal arts degree, which apparently enabled him to become Governor! We need to stand up to this hypocrisy now and protect the valuable institution we have at UNC, before we become an assembly line rather than a school.”

This is when the key support of the government should be felt in the efforts of these universities to maintain a more balanced and ideal model. However, with the current trend of the government reducing economic support for the universities, it is very difficult to assume that many universities will not bend or adapt to a curriculum supporting the MME. It might be just a matter of survival. It might seem unethical to keep preparing our students without perceiving the economic situation of our universities and keep negating a potential valuable economic help from the private sector. However, it might be equally unethical when we focus the perception that we are “selling out” our academic freedom and autonomy just to satisfy the immediate economic needs of our universities. Universities’ four-year programs are incredibly stressed with many academic demands; the insertion of a couple of semester courses (or severely modify the current ones) to adapt to the demands of groups of interest, might hurt their ability to effectively teach our students general skills that in the long term will benefit them.

What does it mean to be prepared for a job? Universities, traditionally and in general, take this statement as a challenge to prepare our student not for specific groups of companies or certain kind of machines; rather, the statement is internalized as a challenge to maximize our students’ critical thinking skills and professional flexibility. Engineering schools teach principles and general laws that can be applied to most environments giving our students the skills for engineering entry-level jobs. Most universities assume their programs will position our graduates in situations at which they will learn as quickly as possible based on the principles taught in academia. Universities should drive their research and curriculum based not only in the private sector needs, but in a strong sense of independent ideas to freely create knowledge. It is not difficult to imagine that if we give our student the “client” status exactly as if they were buying a “thing” in a store, it might entitle them to drive the curriculum (by choosing universities following the MME) in such a way that we must meet their wants for their money. However, academia should be clear that our utmost and final “client” is society and our country as a whole,



not just our students. By giving our perceived immediate clients (our students) whatever they demand for their pay, we might be deceiving our most and preferred client: our country and our society.

### Consequences for Private Sector

Industry might perceive a short term gain and a “relief” by getting engineers and technologists ready to manage their machines, software, personnel, and lines of production “right away.” However, it is a fact that the life cycle of products, software, and machines in our era is short lived. Engineers should be able to quickly learn and adapt new technologies at a speed never seen before in production and design cycles. Therefore, their best investment is to have engineers with solid critical thinking skills and engineering principles so they can apply these principles no matter what the technology demands require and the speed of these requirements. Ultimately, it might be the interests of any company to have this kind of engineers instead of one “ad-hoc” for the current demands. Many companies do not understand the fact that by pressuring universities to change their programs of study to more “ad-hoc” curricula, for a perceived immediate benefit, they might be hurting themselves in the long term. Business models depend generally on recognizable quantifiable results. It is very possible to observe immediate gains on businesses by implementing the MME but difficult to immediately observe losses in educational skills, like critical thinking and innovation, until many years later.

It might seem unethical to prepare our students for short- term gains knowing that the long-term gains of the market will be severely affected. However, it might be perceived as “unethical” also to try to maintain an academic structure which does not respond at all to some urgent needs of a traditional partner-like industry. A balanced solution has to be found. If companies keep thinking that “to be prepared for a job” at graduation means not to invest in training, then it will be extremely difficult to balance their goals and the traditional goals of academia.

### Consequences for the Country

There is no doubt that industry in the U.S. is perceived lately as “lagging behind” in many areas. However, this might be the result of many variables as part of the new alignment of economic forces around the world and the emergence of new markets, to mention a few. We can’t blame only the universities’ programs of study for the lack of competitiveness experienced in society. A recent panel of 22 academic, business and nonprofit leaders warned in a 250-page report that “U.S. research universities are in grave danger of not only losing their place of global leadership, but of serious erosion in quality.” The report, commissioned by Congress, called for a combined effort among the schools, governments and corporations to reverse the decline.”<sup>4</sup>

Cuts in research and in general budgets are a trend felt by most public research universities. According to the same report, there is no clear correlation between government research funds in universities and the overall productivity of the country. There is no doubt that the influx of research money helps the general budget of universities in many academic areas, including curriculum development, training of professors and new hiring, which indeed make an impact in the quality of our engineers and programs. However, the productivity of the country

might not be a major gain by adopting the MME. In the end, the short-term gains universities, and private companies might experience by adopting the MME might be a huge long-term loss for the U.S. if we can't appropriately design a balanced curriculum that meets the need of interested parties.

#### Viable Alternative I: Certificates

The first potential solution is to create undergraduate certificate programs by offering complementary courses that combined with traditional courses in the engineering programs give students certificates in different areas of interest. These complementary courses will be purposely set aside from the traditional curriculum and could be sponsored by private companies interested in training students while in academia. These extra courses could be tailored, as needed, by the market demands and they should not interfere with the traditional curriculum design or plans of the university. With this proposed solution neither professors nor university administrative authorities might feel an interference with academic freedom and yet still provide the private sector needs. Students will perceive these extra courses as a direct investment in their careers and the feeling that they will "add real value" in their efforts to get an immediate job after graduation. These courses could be priced at discounted rates assuming the private sector will supply a big part of the resources needed for their creation and maintenance. If these courses are priced as any other course, the extra money students might invest will probably be seen as a "bargain for their buck" as far as they perceive immediate gains after graduation. The fact they will have an extra Diploma with specific and useful skills should be enough motivation to invest in these series of courses while they are dealing with their traditional courses. These extra courses do not necessarily need to be structured as formal semester courses, they can be a series of short one-month training (or two weeks etc.) seminars that can be taken each semester so students will not feel the extra burden of a full semester commitment. These seminars could be squeezed in during summer breaks and/or December breaks and some within current semesters.

It should not be too difficult to envision a wonderful collaboration between academia and the private sector in this fashion and make almost "everyone happy." The credit units earned in these seminars should count for the certificate and might not be part of the set of credits for the traditional degree. Many universities around the world have two programs running in parallel one leads to a certificate with very practical oriented knowledge (aimed to fulfill the local needs of the private sector) and the other promotes traditional engineering curriculum running quite independent of each other. It has been my personal experience that Catholic Salesian universities around the world<sup>5</sup> run this model with great success. University of Maryland University College (UMUC)<sup>6</sup> offers undergraduate certificates. Eastern Illinois University has implemented this model for several years<sup>7</sup> but at the graduate level. In the above cases those certificates are not completely designed thinking in the private sector but attempt to give students very specific hand-on skills.

#### Viable Alternative II: Offer a Certificate/Training in Partnership with Community Colleges

In this solution universities might create partnerships with local community colleges so both can structure a training agreement. If students have started in a community college, they might take these seminars or training there before transferring to universities where they can take

a couple more seminars toward a certificate. If students start their program in a university, they might as well invest in going to a local community college to complement their traditional college education as a part of a certificate program. This solution might optimize the use of resources by the university and community colleges and might be perceived as “less invasive” to the university environment. This solution also has great recruiting power for both the community college (CC) and the university and will promote a smooth transition for students from CC to universities involved in the partnership. The U.S. Department of Labor has specific partnership programs with community colleges,<sup>8</sup> however there is no known university that has specific “ad-hoc” training programs for their students in community colleges except by the well-known partnerships that allow students to pair credits/knowledge when they transfer to four-year colleges. Indeed there is a well-known and funded initiative by the Obama administration<sup>9</sup> to pair the private sector with community colleges in this endeavor but not universities with community colleges.

### Viable Alternative III: Improved Internships

Internships are well-known and tested activities that when done properly, might fulfill the needs of students and the private sector. Most universities have internship programs, some more effective than others. Unfortunately, internships might lack meaningful experiences for students when they have one-sided tasks and the mentor does not take the time to make it a good professional experience. There are many tasks assigned to the intern that might be irrelevant for their professional development. A detailed discussion of the problems related to a well-known traditional activity in the U.S. is beyond the scope of this paper. However, it is worthy to mention that well-done and well-planned internships are a good solution to the problem. If the private sector is complaining about students’ lack of skills, the way internships are developed within their companies might be part of the problem. Although many internship endeavors might work very well, the bottom line is that if internship activities were working as expected, we might not have people in academia and/or industry claiming the need for “ad-hoc” prepared students. Fixing internship problems and or the students’ participation in meaningful internships still is a viable solution.

### Ethical Discussion

The ethical dilemmas discussed in the previous sections can hardly be classified as pure deontologist dilemmas (A situation is inherently or intrinsically right or wrong) or pure consequentialist dilemmas (Something is ethically right or wrong based on the consequences). The difficulty of classifying the MME based on a pure-consequentialist view comes from the fact that it depends of the point of view of the persons involved and upon the long-term or short-term consequences. Indeed during the San Antonio, TX, ASEE plenary panelists established that having a MME is consequentially right because of the benefits provided to the private companies (Saving money) and to the students (Getting a Job at graduation) However, they were short viewed when analyzing all possible long-term consequences of implementing the MME model.

Instead of adopting a pure-deontological or pure-consequentialist point of view, the “qualified neo-consequentialist approach”<sup>10</sup> will be used to suggest a viable ethical compromise. The reason for adopting this approach is based on the fact that we do not know with absolute

certainty what will happen when adopting the MME. The qualified neo-consequentialist approach classifies the wrongness or rightness of an action based in the following qualities:

1. Refined and focused on harm and well-being:<sup>10</sup> Universities have to focus in the harm or well-being of all the subjects involved. Students, professors and Industry should focus in ample discussions of the benefits and dangers (long-term and short-term) of adopting the MME. We have to look for hidden or subtle effects beyond the obvious ones.
2. Comprehensive: We have to focus in “all possible harm and well-being related effects -Social and cultural as well as economic and physical in nature- of the candidate action, policy, or practice an all pertinent subject involved, remote as well as present”<sup>10</sup> Society and government should take a hard look at the consequences of adopting the MME and if adopted, everyone should be clear of all risks involved.
3. Discriminating: <sup>10</sup> Options for adopting the MME might be considered on a case-by-case basis. The MME might not be a universal formula for every university or might not be dismissed completely. Each state or university might self-assess the need to implement it.
4. Prudent: We have to “embodying an attitude toward safety that, as long as credible jury is still out or if it has returned hopelessly deadlocked, is as conservative as the magnitude of the possible disaster is large”<sup>10</sup>. The call to prudence should be present when implementing any new educational model.

Ultimately the “rightness or wrongness” of adopting the MME or similar versions will hinge on the ample information everyone involved receives. As far as everyone involved is fully informed of all potential consequences adopting the MME, its adoption or rejection will be left to the interested parties based on their own qualitative thresholds of dangers vs. benefits.

## Conclusions

It is more common in professional engineering gatherings to hear the voices of many claiming that universities should be looking for a path that supplies private companies with engineers with the “right skills.” The above trend suggests somehow that it is the obligation of academia to supply the engineers to the private sector demands and that academia might be doing “something very wrong” by not going along with the suggestion. The loud calls to align industry and businesses with academia seem to be reasonable based on economic constraints on both sides and the fact that “our students will benefit from it” and the U.S. productivity will improve. Universities, on the other hand, have been traditionally conceived to be places where teaching critical thinking principles and a combination of general and specific skills can be applied with proper training in any environment. By modifying our curriculum drastically to suit the needs of private sector groups, we might be jeopardizing the long-term gain of our professionals and/or universities in pursuit of possible short-term gains for the companies. The basic economic term in this pursuit is “to add value” to our graduates and our programs, however, there are no formal studies considering if critical thinking and standards of academic excellence will be severely affected or will play a secondary role to this proposed alignment. Having the input of the private sector can “fine-tune” our curriculum and research plans, however, the private sector’s interest should never be the main universities’ mission driver

because the collaborative partnership may severely shift to a pure economic gain if the market modeled education is fully implemented. Ethically, we might question the value of an education that might create a professional dependency for our students because it might restrain their freedom to move to other future potential interests in their careers and to better adapt to any future industrial, commercial, or even academic environment.

If one of the goals of the university is to satisfy the “need of their customers,” as students are, it might be argued that it is unethical to take their money to prepare them with courses that are perceived as not “the best ones” giving the best chances to get a job immediately after graduation. This might be true if academia is conceived only as part of a production line of professionals to meet market needs. However, it might be equally or more “unethical” to try to limit their intellectual growth, their ability to use knowledge creatively, and their market flexibility by “boxing” them into particular group demands. Many professors’ courses are typically designed around their research goals; it is not difficult to imagine that if our research funds become mostly from interested parties in the “market modeled education,” then the content of our courses, sooner or later, will begin to reflect those parameters. The “true stars” in academia will be those who better serve the market demands. This immediately raises serious ethical questions because those risking their jobs by wanting an independent line of research, will be severely penalized negating completely one of the main missions of academia. In the end academic freedom might be the most important loss of all.

Universities should drive their research and curriculum based not only in the private sector needs, but in a strong sense of independent ideas to freely create knowledge. It is not difficult to imagine that to give our student the “client” status exactly as if they were buying a “thing” in a mall, might entitle them to drive the curriculum (by choosing universities following the market modeled education) in such a way that we must meet their wants for their money. However, academia should be clear that our utmost and final client is society and our country. Companies must understand that their best investment is to have engineers with solid critical thinking skills and engineering principles so they can apply these principles, no matter what the technology demands require and the speed of these requirements. Pressuring universities to change their programs of study to more “ad-hoc” curricula, for a perceived immediate benefit, might hurt companies in the long term. In the end, the short-term gains and survival mode universities and companies might experience as a “gains” might be a huge long term loss for the U.S. if we can’t balance the needs of the interested parties appropriately. Certificates, partnerships with community colleges, and strengthening internships are the proposed paths for balanced solutions. Ultimately the “rightness or wrongness” of adopting the MME or similar versions will hinge in the ample information everyone involved receives.

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