

Robert Gold and Eckhardt Bode (2017). Adult training in the digital age. Economics Discussion Papers, No 2017-54, Kiel Institute for the World Economy.  
<http://www.economics-ejournal.org/economics/discussionpapers/2017-54>

Reply to the referee

Dear referee,

We are most grateful for your constructive and insightful comments and suggestions. They helped us greatly in improving the paper. In the following, we provide detailed responses to all your comments in the order of your report. The excerpts of your comments and suggestions from the report are in italics.

*“There is a lack of citations in many parts of the paper. I elaborate on an example of main concern:*

*The paper makes the strong argument that workers hit hardest by digitization are unable to pay for necessary retraining (p.2). The authors should provide more evidence that this is the case ( e.g. empirics, figures). The Economics of Digitization literature has highlighted how in particular mid-skilled workers are affected by digitization, because their work is vulnerable to automation (routine task-intensive). Often low-skilled workers have a high non-routine (manual) part of tasks (e.g. in nursing) keeping them invulnerable to automation. On this note, I would like to see more persuasion that in particular mid-skilled workers are not willing to invest into retraining on their own. Is there a lack of general, affordable training courses provided by the government(s)? Do workers most vulnerable to automation lack financial means and/or awareness for training? How should policy measures best be designed to combat the issue at hand - Is it a question of providing funding, opportunities or education? While the authors touch upon possible, general participation barriers (p. 5), more specificity is needed.”*

We have carefully re-examined the literature and added additional references throughout the paper. With respect to the question which skill-level might be most affected by digitalization, for instance, we have added Acemoglu and Autor (2011) on p. 2, arguing that particularly medium-skilled workers have been negatively affected by digitalization so far, and Bode et al. (2018) on p. 2, arguing that low-skilled workers will be more negatively affected in the future. However, the aim of this policy brief is to take a more detailed look into the skill requirements of the digital age, thus

deliberately deviating from the broad categories of high, medium or low formal skills, but more closely looking into theoretical, non-cognitive and digital skills.

We have added descriptive evidence from the OECD's PIAAC survey (Table 1 on p. 3) to support our argument that low-skilled individuals are in particular need for general training measures and for policy support.

Moreover, we discuss now more extensively the obstacles low-skilled individuals face to participation in training programs, e.g. on p. 7:

“Possible reasons for workers’ non-participation are manifold, including economic and psychological barriers. Economic barriers include age, capital-market imperfections and incomplete information (McCall et al. 2016). Higher age leaves less time for active labor market participation to recoup the training costs through future higher wages. Capital-market imperfections may prevent particularly low-income workers from borrowing the tuition fees of training courses. And incomplete information creates uncertainty about the future returns from training, which results in suboptimally low investments in training. Psychological barriers include a lack of motivation that may be rooted in workers’ personalities or personal experiences. Workers with more external locus of control (who believe their actions to have less influence on future outcomes) tend to participate less in adult training, for example, because they expect lower returns (Caliendo et al. 2016). Bad personal experiences at school during young ages may also discourage workers from participating in classroom-based adult training. And less patient students are more likely to drop out of vocational training, be it because they underestimate its long-term benefits or because they are less willing to bear the immediate costs of learning (Backes-Gellner et al. 2018).”

Along that line of reasoning, we are also more explicit about appropriate policy instruments to help people overcoming these obstacles, e.g. on p. 7:

“Since forced participation in training is not an option because participants cannot be forced to learn, the programs must devote utmost effort to motivating the targeted workers to participate voluntarily. Motivation-enhancing measures should include information and awareness-raising. Eligible workers should, for example, be informed about the reasons why they were selected to participate in a training program, and about the aims of the training program. A recent study by Barr and Turner (2017) suggests that a well-designed campaign of awareness-raising may increase the willingness to participate more than financial incentives. Measures should also include extensive coaching, attractive design of training courses, success monitoring and feedback. How precisely these measures should be designed is impossible to say ex ante, and will likely differ across countries.”

*“Lacking elaboration of arguments*

*It is a dominant view in the literature that non-routine skills complement automation (see e.g. Autor, Levy & Murnane (2003), Bresnahan (1999)). The authors build on a different classification of skills (“theoretical, non-cognitive and digital”) that I personally find a bit confusing. Theoretical skills are often cognitive in nature and seem to conflict with the term non-cognitive (soft) skills. Using their “mixed” classification, the authors should make clearer if workers need to have all three skill sets (theoretical, non-cognitive and digital) combined or to which extent single skill sets are useful.”*

In our notion, general skills (i.e. theoretical, non-cognitive, and digital skills) are needed to perform non-routine tasks, which complement digital technologies.

We now more explicitly define our understanding of general skills that complement technology, e.g. on p.5:

“We label these skills ‘general’ skills to distinguish them from (task-, job-, occupation- or industry-) ‘specific’ skills. ... Unlike specific skills, general skills can be used in a broader variety of jobs and occupations. They also enable workers to complement—rather than compete with—the new technologies to come (Autor et al. 2003, Deming 2017). To characterize them in more detail, we categorize these general skills into three dimensions, theoretical, non-cognitive and digital skills, which complement each other in both learning and application (UNESCO 2016b). “

Additionally, we included footnotes 1, 4, 5 and 6 to refer to alternative definitions and taxonomies of skills.

As to our understanding, none of the general skills is expendable, and they complement each other. We point this out more clearly now, e.g. on p. 7:

“Adult training programs should generally aim at enhancing all three skill dimensions simultaneously, and at the same time help workers with particular deficits in certain dimensions to enhance their proficiencies in these skills.”

*“In midst of the fast pace of technical change of digital technologies, I worry whether simply being able to handle given technologies is protection enough. Such skills may help hinder substitution in the short term, yet not for developing the complementary skills the authors emphasize that provide long term protection. Training in particular in new, non-routine task areas that benefit from input by automation (see e.g. Bessen 2015’s example of bank tellers) is crucial and deserves more emphasis in the paper.”*

We agree that just handling given technologies will not be sufficient. This is why we ask for increasing workers' flexibility in responding to changing labor market demands by improving their mobility across tasks, jobs, occupations, and industries (e.g. pp. 1, 4). The challenge is to enable also individuals with skill-deficiencies to productively work with digital technologies as we point out on p. 5. In this context, we now more clearly state the potential of low-skilled individuals benefitting from automation when performing new tasks, e.g. on p. 4:

“Digitalization provides manifold opportunities to increase labor productivity, also of low- and medium skilled workers. With digitalization, new tasks emerge that require cooperation between man and machine but not necessarily a college degree. As technologies become “smart” and “intelligent”, they can make up for workers' insufficiencies and allow them to focus on tasks where they have skill advantages. To tap into this potential, workers need to be trained to productively work with technology. Theoretical, non-cognitive and digital skills are complements to technology in a variety of work tasks. Training these general skills will therefore help workers to flexibly adjust to technological change. It will increase their mobility across tasks, jobs, occupations, and industries, thus increasing their employability. This will not only reduce technological unemployment resulting from digitalization. It will also reduce polarization and social tensions in the digital age.”

*“In parts of the authors' definition of non-cognitive skills (e.g. patterns of values, behaviors and attitudes), it is further unclear whether these skills can be affected by training at all. More evidence would be helpful.”*

We have added some references on that on p. 6:

“Recent evidence suggests that non-cognitive skills may in fact change over the life cycle and may be affected by own investments or changes in external life circumstances (Almlund et al. 2011: Section 8, Schäfer 2017). For example, people tend to become more conscientious, more agreeable and emotionally more stable over the (adult) life cycle (Almlund et al. 2011: 119). More research is needed on the extent to which non-cognitive skills may be shaped through deliberate investments during adulthood, though (Almlund et al. 2011: 150).”

*The authors provide an elaborate overview on suggestions for administration and control for the programs (p.6). However, this specification is lacking with regard to the content of general training programs. More “hands-on” advice concerning many questions related to the program is needed. Examples:*

*How will new programs differ from existing (general) programs? I am missing a feeling for expected costs for the program (e.g. how much is the mentioned “lion’s share”, p. 6?).*

*How will the programs consider differential needs across affected occupations? How will the programs create room for differentiation of skills, crucial for workers to be competitive?*

*How to meet the psychological challenges workers face in participating in retraining? The argumentation that non-cognitive training is the solution to the problem (p. 5) is not persuading enough (e.g. how does this change views on being externally controlled or motivation problems?)*

These are valid points, indeed. We see them as a natural limitation of a policy brief addressing the whole body of G20 countries. Already on the national level, it would be extremely difficult to come up with concrete “hands on” advice on specific training measures, and concrete costs. Reliable program evaluation in education economics is an extraordinarily difficult task. This is why we ask for a permanent scholarly evaluation of the program’s success, e.g., on p. 9:

“In each country, the initial phase of the programs will be characterized by high uncertainty about program success and extensive learning about effective incentive systems for eligible workers, appropriate curricula, preferred course designs, and effective administration. This learning will require a good deal of trial and error. It may even be designed as a series of controlled, scientifically evaluated experiments that expose randomly chosen workers to different incentive systems, curricula and course designs. While trial and error will likely limit the program’s benefits for individual participants during this initial phase, the longer-term social benefits in terms of institutional and operational learning will be comparatively high. This is why the initial phase should be financed mainly by public funds.”

Moreover, we are addressing a rather heterogeneous set of countries, with varying institutional frameworks. We strongly believe that the concrete setup of adult training programs must take these specificities into account, as we highlight e.g. on pp. 7-8:

“The willingness to participate also differs considerably across countries, depending, among others, on the peculiarities of the countries’ economic and cultural institutions as well as on their education systems (e.g., Boeren et al. 2012, Cincinnato et al. 2014, Roosmaa and Saar 2017). Since forced participation in training is not an option because participants cannot be forced to learn, the programs must devote utmost effort to motivating the targeted workers to participate voluntarily. Motivation-enhancing measures should include information and awareness-raising. Eligible workers should, for example, be informed about the reasons why they were selected to participate in a training program, and about the aims of the training program. A recent study by Barr and Turner (2017) suggests that a well-designed campaign of

awareness-raising may increase the willingness to participate more than financial incentives. Measures should also include extensive coaching, attractive design of training courses, success monitoring and feedback. How precisely these measures should be designed is impossible to say *ex ante*, and will likely differ across countries. Exploring successful ways of motivating eligible workers to participate in the program will likely take several years of trial and error, and will have to be supported by careful scientific evaluations and extensive exchange of experiences. The G20 should encourage and substantiate these evaluations and exchanges.”

Some countries might just have to increase the portfolio of educational institutions already in place, while others will have to establish new institutions from scratch. Against this background, we deliberately refrain from guessing about the overall cost of the program. We do, however, ask for structural information exchange between G20 countries to facilitate organizational learning, see the last paragraph on p. 10, which reads:

“The G20 should support regular exchange of information on successes—and failure—of the national training programs. To facilitate learning across national borders, and to establish an additional layer of checks and balances, the G20 should request comparative periodical reports on all national adult training programs. These reports should be prepared by international organizations specialized in the field, for instance the UNESCO, the OECD or the ILO. The comparative reports should include elements of evaluation. They may, for example, identify best practices in the various activities of the national agencies or limitations to the international transferability of specific activities. Such evaluations will not only help improve the effectiveness and reduce the costs of national programs in the G20 countries. They will also help third countries in establishing their own adult training programs to better meet the challenges from digitalization.”

*Overall, while the authors provide appealing arguments for why firms alone should not train workers for the digital age, I miss discussions on (and solutions to) the challenges governments face. Scholars in the literature have criticized that institutions such as universities are too rigid and formal to adapt trainings programs to the pace of technical change. (Often also educated workers lack the skills needed on the job!) Why and how will governments perform better?*

We discuss these issues in Section 2.4. We are asking for a new institution that focusses on training for employed workers. This agency should be responsible for the design of the training measures, for instance by

“Determining and occasionally adjusting the range of eligible workers, possibly based on reliable studies of the susceptibility of occupations or, for that matter, tasks, to being automated in the respective foreseeable future, ...”. (p. 9)

The courses could be offered by existing institutions like universities or vocational schools, but one should also explore opportunities of online-courses and training at the workplace. Again, this largely depends on the institutional setup in the respective countries, this is why the agency "... should be embedded in the national education system" (p. 9). However, "The governments should grant the program agency far-reaching autonomy, enabling it to explore feasible ways to design and implement the program" (p. 9).

*I wonder to which extent cooperation with firms is essential in designing training programs. How will governments gain the relevant knowledge to train employees for the digital age? This discussion is missing in the paper and I find it very relevant.*

This is why we suggest implementing a supervisory body, including representatives from trade unions and employer associations, in section 2.4 (p.10):

"Governments should appoint a supervisory body for the program that advises and monitors the program agency. This supervisory body should represent all relevant stakeholders, including the government (notably the Ministries of Education and Labor), the national unemployment agency, employers' associations, trade unions and researchers (notably from education, psychological and economic sciences). The supervisory body should, on the one hand, serve as an advisory council to the program agency. It should continuously communicate the needs of all relevant stakeholders to the agency. On the other hand, it should critically supervise the agency's policy. It should, for example, regularly commission independent evaluations of the agency's policies regarding the eligibility of workers, the incentive systems, the courses' contents and cost-effectiveness. The results of these evaluations should be fed directly into the program agency to facilitate timely improvements of the system. They should also be published to keep the public informed about the development of the adult training program, thus raising people's awareness of changing skill demand in the digital age."