

DEVELOPING STAFF FOR EFFECTIVE CDIO IMPLEMENTATION

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ABSTRACT

CDIO Standard 10 – Enhancement of Faculty Teaching Competence – is important if the implementation of CDIO is to be effective and if the student learning is to be fully realised. A clear and robust approach to the development of staff teaching competence is something that benefits the wider institution even if CDIO is not the primary framework for delivery.

This paper discusses the results of a survey administered within the UK and Ireland CDIO and related community that explores the training and development opportunities afforded staff when they are engaged with CDIO teaching practice. The survey suggests that there is little bespoke training taking place and that this is a gap that needs the attention of the community. It does emphasise the importance and value of the network in promoting some sharing, but a more evidence based approach to Standard 10 would be beneficial to all.

KEYWORDS

Staff development, competency, training, motivations,
Standards: 10

INTRODUCTION

CDIO Standard 10 – Enhancement of Faculty Teaching Competence – is important if the implementation of CDIO is to be effective and if the student learning is to be fully realised. A clear and robust approach to the development of staff teaching competence is something that benefits the wider institution even if CDIO is not the primary framework for delivery.

In the UK, the advent of the Teaching Excellence and Student Outcomes Framework (TEF) (Department for Education, 2017) has afforded the engineering education community an opportunity to make progress in the area of staff development. The TEF is an attempt to 'measure' teaching excellence and the value of the learning process in enabling students to get meaningful jobs on graduation. In engineering education, the CDIO framework is uniquely placed to promote teaching excellence within a real-world focused learning environment. To make this effective, staff need to feel confident and empowered in enabling learning using the CDIO framework.

To date, much of the staff development and training that takes place is generic and often not focused on engineering as a discipline, let alone the CDIO approach. Experience suggests that much of the development of staff takes place on the job and with colleagues acting as mentors.

The recently completed QAEMP Project conducted by 8 institutions across Europe suggested that there is certainly a need to explore more structured CDIO focused training and development to support faculty as they engage with their teaching (Schrey-Niemenmaa et al. 2018, Clark et. al. 2015, Bennedsen 2016). In this project particular STEM based subject groups within the institutions assessed their competence over a range of 28 diverse criteria, some of which mirrored the CDIO standards, while others examined issues such as employability, entrepreneurial activity and the engagement of students in programme review and development. The aim was then to match institutions with weaknesses in particular areas with those strong in these areas and vice versa. It was found however that the criteria relating to “Faculty Development (knowledge and teaching)” was almost universally poorly rated in terms of mastery by the participants but was of significant concern to all. (Clark et al. 2016)

A review of recently published papers on CDIO also shows that initiatives to support schools in developing their processes and infrastructure to address Standard 10 are not particularly extensive in the literature (see Figure 1). This may be because it is seen as a particularly difficult problem to tackle which is likely to require a degree of institutional culture change, something that may not be in the gift of those typically active in the CDIO community.

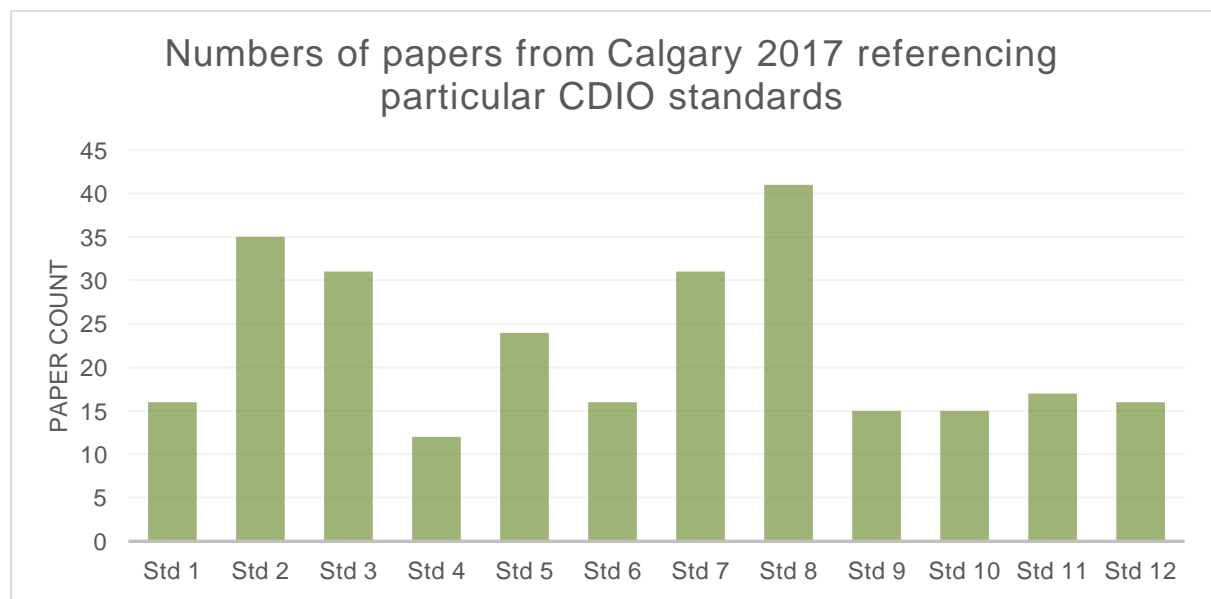


Figure 1. Papers at the CDIO Conference 2017 in Calgary, self-reporting as featuring particular CDIO standards.

Leong et. al. (2016) offered one of the few reports of a fully structured approach to staff teaching competence development. This paper reports experiences at Singapore Polytechnic where a number of processes are in place to both induct new staff and support and develop

staff on an ongoing basis. This latter objective is achieved by a range of measures including formally trained academic mentors to support more inexperienced staff, platforms for sharing best practice, and developing a structure for staff development based around a number of competency domains.

Outside CDIO there are a few groups attempting to develop similar types of structures to support faculty in a relatively holistic way by drafting in academic mentors and specialists to support on an individual or programme basis (Yuen et. al. 2016) or to take a very top down approach to faculty development (Shankaranarayana et. al 2013) however neither approach appears to have been implemented as yet in a systematic or sustained way.

By contrast most of the work published in relation to Standard 10 tends to focus on discrete packets of staff development rather than a more structured overall approach with linked elements for staff at all levels in their career.

This is not unique to CDIO, with for example, Bhadani et al. (2017) and Cleveland-Innes et. al. (2017) describing formal training courses to help staff develop competences while other work has focussed on, spells in industry to support staff currency and focus (Kontio et. al. 2015).

A number of other papers reference Standards 9 and 10 though the focus of the paper is more on a mode of teaching or curriculum initiative with some degree of staff development implemented to allow for these. (eg. Wikberg-Nilsson et. al. 2017, Gommer et. al. 2016). In all cases however these tend to present localised elements of good practice rather than a strategic plan for whole faculty and career long development.

The issue of staff development, recognition and reward in the field of engineering education has been a topic of discussion for many years, Recent developments have seen the publication of a proposed framework by the Royal Academy of Engineering (2018). It is within this framework that potential new approaches to staff training and development could be located. Specifically within the UK, the value of the Higher Education Academy Professional Recognition Scheme in promoting development should not be underestimated, although specific guidance around active approaches to learning is not included (Higher Education Academy, 2018).

To help understand the issues around staff development and some of the drivers and barriers to developing holistic structures to support staff it was felt that an audit of current practice and views was required.

METHOD

To evaluate the views of the community, an online survey was developed and circulated among the UK & Ireland community of existing and potential CDIO members. This asked around 20 questions, formatted as multiple choice, factor ranking and free text questions and covered current practice with regard to staff learning and teaching development. The questions were developed and reviewed by both authors to ensure both coverage of the topic and clarity in the questioning. In addition to demographic data and a record of existing practices among the respondents, a gathering of views on what the participants felt were the key drivers and retarders in developing structures and resources to enable effective staff development was also recorded.

The survey collected the responses of 11 individuals from 11 different institutions.

RESULTS

Of the 11 participants in the survey, 6 were CDIO members while the remainder had expressed an interest in joining and had typically taken part in a CDIO conference or meeting.

An audit of the participants' position on the rubric rating for Standard 10 showed a full range of responses for both CDIO members and others (Figure 2) with no correlation between involvement or experience of CDIO and position on the rubric.

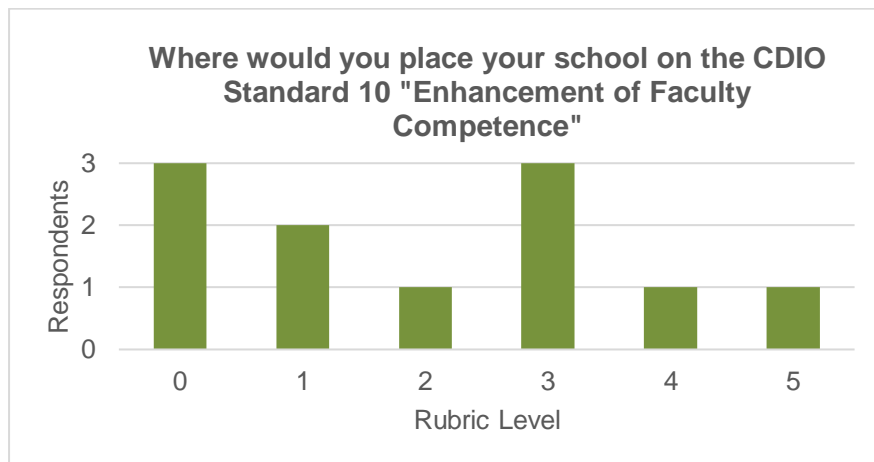


Figure 2. Self-assessment for Standard 10 among participants

This appears to highlight two issues. Firstly that even among very experienced CDIO members there was often very low ranking of compliance to this standard but also that the rubric itself is open to a significant degree of interpretation which was indicated by some of the responses given to justify the ranking. Eg. the participant evaluating their school at 5 – “Faculty competence in teaching, learning, and assessment methods is regularly evaluated and updated where appropriate” was largely justified due to the use of student feedback forms and normal module review. Other institutions using similar processes however felt this was not necessarily valid without a structured rather than ad hoc training framework.

The participants were also asked to rate what proportion of staff were involved in active learning and, in most cases, less than 40% of staff were involved. By implication, this suggested that a significant proportion of staff even within CDIO focussed groups continue to teach entirely using more traditional approaches. (Figure 3.)

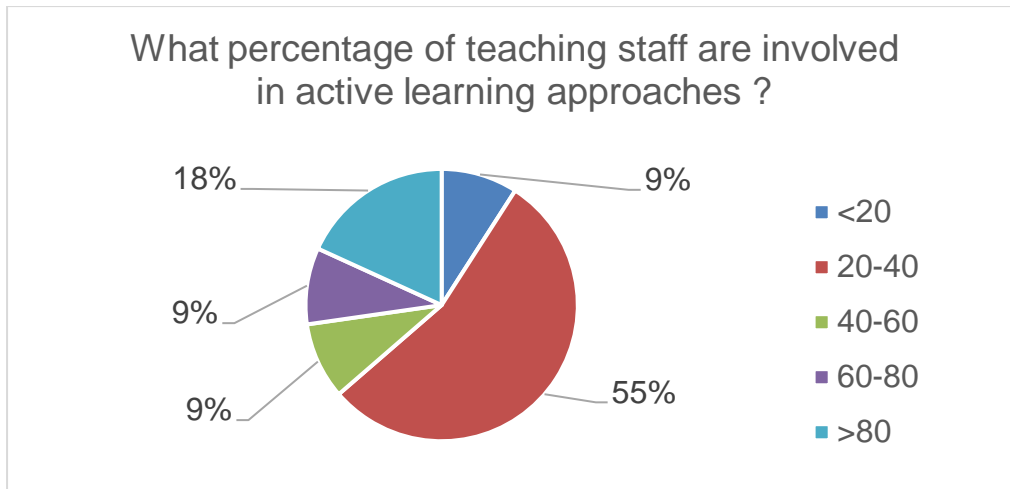


Figure 3. Proportion of staff in participant organisations involved in active learning.

Participants were also asked about the barriers preventing staff developing their teaching and learning competencies by ranking a range of options. (Figure 4)

**What barriers, if any, are present that prevent staff developing their teaching and learning competencies?
(Rank all those that apply with 1 being the most significant barrier)**

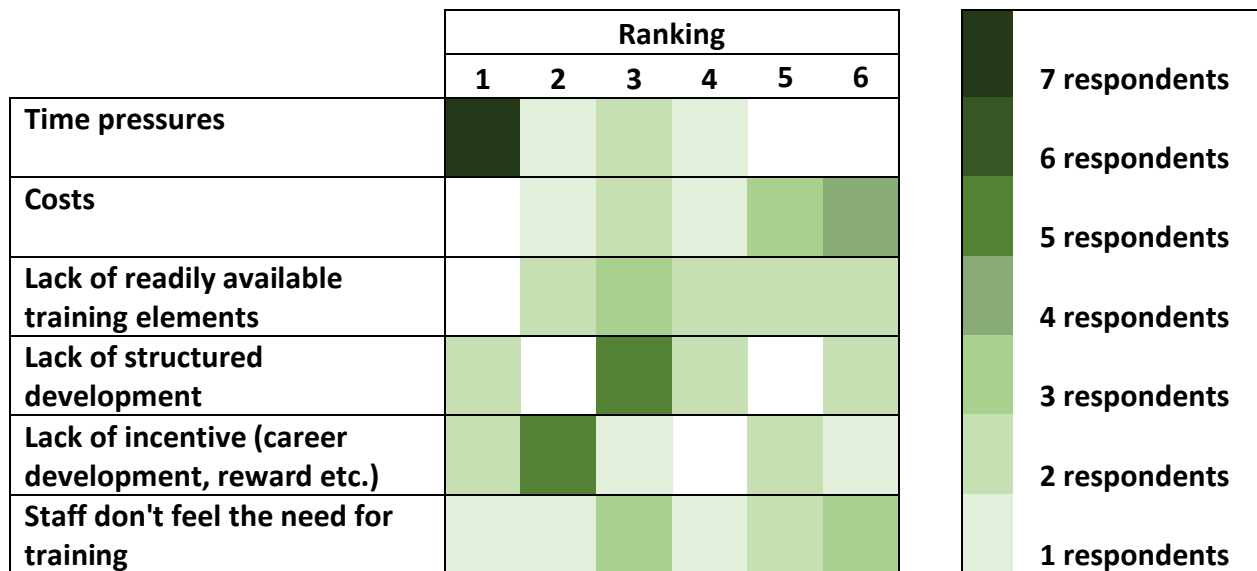


Figure 4. Barriers to developing teaching and learning competencies

It can clearly be seen from this, that time pressure is perceived to be a key barrier to staff developing their teaching competence. This also appears linked to the other relatively prominent barriers – that of lack of incentive and lack of a formal structure to develop the learning and teaching aspects of careers. Staff felt that while they would like to develop their

competences, with no clear pathways to advancing their careers through learning and teaching, research and industrial involvement would become more pressing and rewarding.

The lack of structure in developing staff competences in learning and teaching was also apparent in some other responses from the survey. While within the UK Higher Education sector no teaching qualifications were traditionally required for academic posts, this is now becoming rare and new academics will normally be expected to obtain a postgraduate certificate in higher education within a few years of appointment. Beyond this however, and for those further into their careers, the training and support reported seemed very mixed and ad hoc. Participants reported in general that an individual's competence in teaching would be formally reviewed at their annual review but that structures and facilities to support staff grow their competence were piecemeal and ad hoc. This lack of structure means that the development of staff becomes a very 'personal' experience and one that does not actively promote consistency within the teaching team.

When asked about the mechanism for staff taking part in a development activity only two of the 11 respondents indicated that this would be "Part of a structured programme of development" with the remainder indicating that any development would be "ad hoc based on an immediate need or availability of training" or simply "self-directed". In the words of one respondent :

"Faculty teaching competence has been left to individuals or the Head of School to "manage" with no systematic approach to improvement or monitoring"

It was also apparent that development of competence over the wider faculty was often down to the motivation of individuals with little or no systematic drive to improve quality among all staff unless there were serious problems.

"It is ad hoc at our University - if people want to enhance their teaching, they attend the courses etc, but there has been no benchmarking study and no plan to do one"

"Enhanced peer support programme works well to lift the poorest teachers / modules - not necessarily in ALL though. Not enough is done to target the acceptable but not great (teachers)"

"Our Centre for Educational development provides opportunities for staff to develop in this regard, but it is at the discretion of staff to engage with them. There are individuals in our School who also implement good practice in this regard, but there is little dissemination or development practised"

"While a postgraduate certificate is a requirement for probation, this is a University scheme. The Faculty has no specific training and any that is in place is self sought and organised"

As in the last comment it was also noted that any structured training was often organised centrally and would not necessarily be tailored to the constraints and opportunities afforded by engineering disciplines, particularly with regard to active learning. Increasingly this gap is being considered one that needs addressing both from the staff and importantly the student experience viewpoints.

"We have a central teaching and learning department that runs training across the University. This is not always suitable for engineering types"

The respondents also reported that perhaps only 10% of staff in a given year would take part in a formal training event related to active and project based learning.

Given some of these issues and the lack of wholesale engagement in development of individual and collective teaching competence, the participants were asked to rank incentives which might be in place to help encourage and support staff to engage in learning development. (Figure 5)

This however did not give a particularly good consensus with regards what might be the routes forward to encourage staff to engage in development activities. Note however the question referred to practices currently in place at the participants' institutions rather than a wish or ideas list which perhaps should feature in any follow-up study.

**What incentives, if any, are present which help staff to develop their teaching and learning competencies?
(Rank all those that apply with 1 being the most significant incentive)**

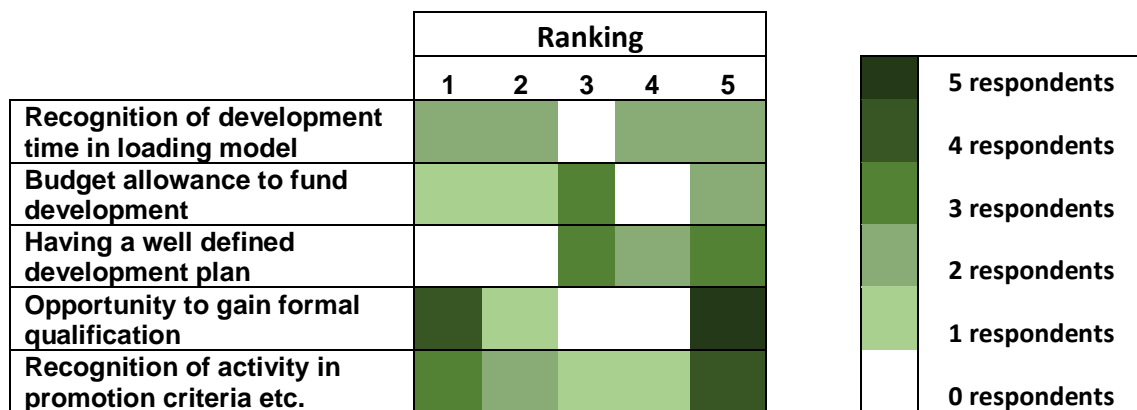


Fig 5 : Incentives to support staff development.

The respondents were also asked about specific competencies which they felt were most in need of development which did highlight some key concerns of staff working directly with students on a day to day basis. Asked to list three, among the responses were:

“First is a recognition of the importance of a systematic review and appraisal of teaching competence.

Second is the ability to effectively use active learning practices within large classes.

Third is the ability to effectively reflect on learning within classes, and not have to wait for the summative assessment”

“1. Ability to supervise Capstones - coaching students in group DBT;

2 Ability to nurture the development of professional skills in all modes of teaching;

3. Ability to replace 24 hrs of chalk and talk with integrated learning experiences that target skills as well as knowledge acquisition”

The respondents were very much split down the middle with regards to whether they felt staff development would be an increased priority in future – (6 said “no”, 5 said “yes”).

Asked about the drivers and retarders of any change, a number of key themes could be seen from the respondents’ comments.

It was recognised that the higher education arena is now very much a marketplace and good teaching and learning environments with strong student satisfaction should be to the fore with almost all respondents noting this as a key driver of change.

“Staff will have to develop or programmes will close”

“Student satisfaction is now very important to us”

Though others warned of caution regarding the over emphasis on student satisfaction as a measure of educational quality and that it could also act as a retarder.

“Reliance on student feedback and obsession with students "enjoying" their course are making schools risk averse and are significantly retarding innovation”

The use of external metrics – the UK’s TEF and NSS – were highlighted by one respondent as being designed to foster change, but that the metrics used may not reflect good quality teaching and learning.

“The NSS does not accurately measure the teaching standards. The introduction of the subject level TEF may have a more granular impact, but it is still a blunt tool. So whilst the NSS and TEF may drive changes in the sector, they are unlikely to be effective at creating positive change when there are inadequate measures to record the improvements being made”

The key retarder was commonly seen to be senior management expectations regarding the development of high level research and industry portfolios, with teaching and learning arguably taken for granted.

“The continued emphasis on disciplinary research and implication that this is what defines and rates academic staff will always retard change or focus on teaching.”

“Also, the appointment of professors who only do research in the hope that it will bring the University higher in world rankings - this means more teaching for other academics.”

“Management are retarders of change, it's not seen as important.”

CONCLUSIONS

This survey has shown that there is significant appetite among those directly involved in CDIO on the ground to develop learning and teaching competences on a personal basis and among colleagues. Barriers do exist however and there is unquestionably a degree of frustration that the rewards which could be reaped by a strong and proactive focus on the development of learning and teaching are not always seen by senior management.

In the UK, the introduction of the TEF has been designed to try to bring the student experience and quality of teaching and learning much more to the fore. This however is viewed with some caution as to whether this will achieve the desired goals or simply be “gamed” or divert attention away from core competencies. A recent survey of the UK Student Population () suggests that the TEF is liked and will remain, although it is inevitable that the metrics will further evolve over time. This is being explored at present, with work looking at what learning gain is and pilots taking place to explore the measurement basis at the subject rather than the institutional level.

While not a direct metric in the TEF, the increasing movement of most Universities within the region to expect some form of formal teaching qualification or recognition for all staff should be welcomed though a much wider and more mature model of continuous development and opportunity will be necessary for the sustainability of provision in a competitive climate.

CDIO Standard 10 however is an incredibly important one for the long term continuation of the initiative within institutions and more generally. The reliance on senior management to enable the culture change needed and recognise the need for continuous staff development can perhaps explain, at least from a regional context, why little deep and holistic work has been reported on staff development.

While very much a mixed picture there is some hope that the student voice and market forces will see increasing emphasis on learning and teaching and that as a collective CDIO and similar organisation can continue to drive forward learning and teaching competence. Within the region and the wider community there is an extremely positive and passionate group of academics keen to foster better approaches to learning and teaching and a very considerable enthusiasm to help develop strong approaches to helping staff develop their learning and teaching practices. As such, it is anticipated that this work will continue, both in terms of understanding and developing usable outputs for colleagues.

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