NEXTGEN: HNC ENGINEERING

META-SKILLS IN PRACTICE

Practitioners' reflections and advice on incorporating meta-skills.

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NEXTGEN: HNC ENGINEERING — META-SKILLS IN PRACTICE

This 'Meta-skills in practice' guide brings together practitioners' reported experience of contextualising, integrating and assessing engagement with meta-skills within NextGen: HNC Engineering. Course teams coming new to NextGen and meta-skills will find some insights, practical advice and examples to get you started with thinking about meta-skills delivery.

TOP TIPS

— Manage and coordinate all activity related to engineering project tasks and meta-skills development goals effectively, so that learners are clear about what they have to do.
— Review and check meta-skills development at various checkpoints and appropriate milestones throughout the course.
— Make learners fully aware of all the tasks and milestones that lie ahead — including meta-skills development — so that they can plan their own progress accordingly.
— Ensure each learner has a meta-skills mentor as well as an engineering mentor (these may be the same assessor).
— Present meta-skills development as a natural part of the learning experience.
— Encourage learners to set meaningful, realistic and achievable meta-skills goals.

META-SKILLS IN ENGINEERING

Give us a general introduction to meta-skills within the context of your subject area.

The engineering industry is at the forefront of innovation, and engineers must adapt to near constant evolution. The sector is looking for engineers who can draw upon a rich mix of interconnecting skills. Meta-skills sit alongside and complement technical knowledge, skills, behaviours and competence, as well as learning for sustainability. The importance of these types of transferable skills is well established; the Engineering

Council define key competences and commitments for all levels of professional engineer, regardless of discipline. At HNC level, there are 18 key competences grouped across 11 Engineering Council areas of learning.

These professional competences are well reflected by the technical and meta skills in NextGen: HNC units. There are lots of pathways and routes through the qualification. Whatever the pathway, learners have lots of opportunities to hone the skills they will continue to strengthen through their professional experiences.

Meta-skills shouldn't be seen as an 'add on' — something that has to be ticked off on a Friday afternoon. The important thing is to get learners to understand and develop their ability to combine meta-skills and professional behaviours — critical thinking, creativity, communication, collaboration — with the technical aspects of the course.

META-SKILLS CATEGORIES IN CONTEXT

Explain the three meta-skills categories as they relate to your subject.

SELF-MANAGEMENT

- Self-management is a fundamental skillset for an engineer. The ability to focus and adapt is necessary for most units of the course. Supporting learners to develop these skills now helps to prepare them to work with care in complex tasks — for example, with dangerous machinery or complex data. This skillset ultimately helps to prepare learners to cope and thrive within fast-paced and changing environments; to adapt to new technologies, methodologies, or contexts; and to take initiative and deliver improvements in complex, high-stakes situations.
- Professional behaviours, accuracy, rigour and ethical conduct are vital for engineers. This course gives learners opportunities to consider the importance of honesty and integrity in their future work; for example, in meeting stringent codes of professional conduct and standards, and ensuring public safety.
- Under self-management, learners can consider broader goals around time management, handling stressful situations, balancing priorities, academic integrity,

and healthy habit forming. You can help them connect these to their coursework or assessments.

SOCIAL INTELLIGENCE

— Flag and discuss social intelligence skills with learners as part of group activities, to help them understand the benefits and importance of being able to work collaboratively and cooperatively towards deadlines and clear expectations. This is an important aspect of their course and their future working lives.
— The technical nature of the course naturally lends itself to supporting learners to follow and interpret complex information. To extend this, project- and problem-based learning is a brilliant way to support them to develop their ability to express complicated ideas in simple ways; for example, making and discussing proposals, giving justifications, and settling on conclusions. This can help prepare learners for future communications with clients or customers, and you should encourage them to reflect on these learning opportunities wherever possible.
— It is also useful to demonstrate the broad application of leadership skills — that they extend beyond managing teams to the planning and implementation of tasks; the management of programmes of work, schedules and budgets; and resources management.

INNOVATION

— This solution-driven skillset is key in engineering. The Engineering Systems Principles unit links particularly well to innovation. Curiosity is vital for continuous learning and problem solving; creativity for tackling challenges; sense-making and critical thinking for interpreting complex problems, undertaking diagnostics, fault finding and ultimately improving processes.
— There will be rich opportunities throughout the qualification for learners to develop their innovation skills, such as critical thinking and creativity. For example, project-based learning requires learners to plan, assess and solve technical challenges, which in turn requires the full range of innovation skills: making sense of a

problem, thinking critically about the challenges, being curious about possibilities, and creative in designing solutions.

— Emphasise to learners how important it is to develop their 'situational memory'. Not every situation requires an innovative solution — sometimes it is most appropriate to transfer learning across from one context to another: from project to project, location to location.

INTRODUCING AND UNDERSTANDING META-SKILLS

How do you help learners to buy in to meta-skills and understand their relevance?

INTRODUCE META-SKILLS EARLY, AND REPEAT AS NECESSARY

Meta-skills are best introduced to learners as part of the induction process. Induction programmes can be intensive, however, and it's important to be mindful that learners won't absorb all the information straightaway. It will normally take approximately three weeks for learners to settle into their programme of study, get to know each other and all the assessors.

> "...be mindful that the learners won't absorb all the information straightaway...

By this time, learners may be allocated engineering tasks that contain a meta-skills element, such as a group activity. This would be an appropriate time for them to develop their understanding of what meta-skills mean in relation to engineering, what their own skills are, and how the two connect.

Enginuity, the sector skills council for engineering, focuses on transferable skills, which might help to further underpin the relevance of meta-skills and nudge them towards completing their initial meta-skills self-assessment.

Approximately four weeks into the academic session, learners will likely have a good overview of the work ahead of them, and should be aware of critical elements of the course, such as grading, learning for sustainability and meta-skills. This is a good

opportunity for learners to undertake an initial meta-skills self-assessment (if they haven't already), set goals, and plan associated work activities.

Within the engineering qualification, lecturers should try to keep goal-setting simple, asking learners to reflect upon a series of questions: What skills do you want to develop? Why have you chosen this skill? What next action(s) will you take to develop this skill?

To support learners, staff should set milestones and reflective log checkpoints for them to aim towards. A meta-skills mentor could be a useful addition when setting these targets. The separate grading pack, which lists the Engineering Council key competences, can help learners set relevant goals. The whole course team (and meta-skills mentors, if you go down that route) can demonstrate the links between meta-skills, key competences and professional practice project tasks, and give some sense of the types of activities that can help learners to achieve their goals and develop their skills.

> "...demonstrate the links between meta-skills, key competences and professional practice project tasks...

DEVELOPING META-SKILLS

Tell us about your experiences, hindsight and future plans. Where do meta-skills fit most naturally in your course delivery?

The obvious importance of a transferable skillset like meta-skills doesn't always translate into learner engagement and enthusiasm. It's important to try to get learner buy-in early, so that it continues throughout the year. It's also good to encourage learners' regular engagement with meta-skills by ensuring the whole course team integrates them into their teaching. This can be as simple as emphasising 'why' these skills matter when introducing new content and/or activities, and how the skills will enhance their prospects and effectiveness as an engineer. Using or discussing real-world engineering scenarios or

> "...emphasise why these skills matter

case studies is an easy and relatable way to segue into natural discussions about skills and to underpin their application in practice.

It's worth remembering that learners can reflect on any opportunity for meta-skills development — no matter the unit — and present this as evidence of their engagement with the concept. The meta-skills outcome is included within the 4-credit, Professional Practice in Engineering unit, which in part aims to improve learners' professional approaches and behaviours through the development of meta-skills (outcome 5). This unit, in particular, allows learners to pull together that broad skillset and demonstrate their learning by working together in a small team to complete a work-related engineering project. Learners can combine collaboration with engineering knowledge and skills towards the design, development and evaluation of solutions to a real-world engineering problem.

> "...learners can present any meta-skills development as evidence...

Following their early introduction, it is useful to revisit meta-skills especially within the Professional Practice in Engineering unit. You should make sure learners are fully aware of all tasks and milestones in this unit, including the opportunities for meta-skills development that lie ahead. The unit focuses naturally on problem solving, team work, project management and communication. Learners must create a project plan in outcome 1 and this can also include meta-skills milestones. This allows learners to plan their progress accordingly, and use reflective logs at appropriate milestones and/or checkpoints to help them look back on and chart their progress towards their goals and skills. You can also ask learners to reflect on their meta-skills development use in case study assessments.

GENERATING ASSESSMENT EVIDENCE

Learners are assessed against their engagement with the process of meta-skills development. There are three key stages of meta-skills development:

— Meta-skills baseline self-assessment
— Planned meta-skills development — setting goals and outlining actions
— Monitoring goals and reflective practice.

This process aligns well with the following Engineering Council key competence:

'H18. Plan and record self-learning and improve performance, as the foundation for lifelong learning/CPD; and future organisational performance management processes.'

In their NextGen: HNC Qualification, learners get a feeling for where they are with all 12 meta-skills as they complete their initial baseline self-assessment. They can discuss this with a nominated assessor, to help them set goals for the duration of the course.

These goals should cover all three meta-skills categories — self-management, social intelligence, and innovation — and a range of meta-skills. Where possible, these meta-skills goals should be linked to engineering tasks learners carry out, as well as course and unit milestones, but they can also include areas of personal development that your learners want to work on. It's so important that assessors are involved in supporting and monitoring goal-setting, planning, milestones development and reflective logs. In this way, they can check they are balanced correctly, align with professional standards where possible, and meet the required standards for evidence.

> "...meta-skills goals should be linked to engineering tasks learners carry out

Meta-skills assessment should focus on the nature and quality of the learners' self-reflection and self-evaluation, rather than on the achievement of specific meta-skills. Learners aren't under pressure to reach a certain standard, but they can be supported to deepen reflections, which often feel difficult or unnatural, through

one-to-one discussions, group and peer discussion, assessment feedback, modelling, and chats around professional standards.

And remember — although the meta-skills outcome is located within the Professional Practices unit, and this unit offers abundant opportunities to plan for, develop and reflect upon meta-skills — learners can and will be developing their skillset throughout all units. The qualification design encourages and allows for learners to generate assessment evidence for meta-skills development at any point in the course — as they work with others, solve problems and achieve objectives.

> “…learners can and will be developing their skillset throughout all units

SUMMARY OF RECOMMENDED RESOURCES AND APPROACHES

- Meta-skills connected to sector skills
- One-to-ones with mentors and class discussions
- SQA Academy materials
- Meta-skills Development Log
- Integrate meta-skills with course assessments