Phronesis: Deliberative Judgement as a Key Competence in the Post-Covid Educational Environment

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***Abstract*—The global Covid19 pandemic which began in early 2020 is one of the most socially disruptive events to have occurred since the Second World War. It has left a profound mark on the institutions of society, including those charged with education, and its effects will be felt for many years. In this paper, we discuss some of the effects that public health policies have had on the practice of teaching, learning and assessment in the United Kingdom. We review at some of the literature on how current students have coped with the experience of education during Covid and look at potential difficulties that new students may now face when entering university. We suggest that the concept of phronesis, that is practical wisdom or prudential judgement, which can also be thought of as the faculty for making deliberative and evaluative judgements about courses of action, will be a crucial element of any recovery pedagogy since the problems faced are context-dependent and generally involve finding the most effective solutions among a range of options.**

Keywords—phronesis, deliberative judgement, Covid Pandemic, student experience

I. INTRODUCTION

The global Covid19 pandemic crisis that swept the world in early 2020 has left a profound mark on the educational landscape [1]. The loss of on-campus teaching in pre-school, primary, secondary and university education and the rapid attempted shift to online learning environments - what has been termed "emergency remote teaching" or "emergency remote learning" [2] - that resulted from lockdown policies in many countries, presented a sudden and dramatic change to almost all aspects of educational delivery, the effects of which will remain with us for a significant number of years. This crisis in delivery has been quickly followed by a crisis in assessment, as social and political attempts to ensure that students are not penalised for inevitable poor academic performance because of the Pandemic, has led, in many cases, to changes in policy and practice which had a deep effect on the educational environment. In many countries, a number of operational measures have been taken at local and national level to try to mitigate the damage to the educational prospects of individuals currently in the educational system. While some of these have been successful in deflecting immediate negative effects for individuals, they have often come at a price and may have problematic outcomes when it comes to student preparedness for further learning.

The question of how the global educational system can address some of the many issues raised over the last two years is a fundamental one and much depends on the processes by which it is to be tackled, and their outcome. Political and social interventions that seek to tackle the short-term problems of, say, secondary school students ready to undertake national exams, the results of which are used by universities to make offers of undergraduate course places, have sometimes led to the creation of bigger long-term problems for the very students that they seek to help. While some have managed to draw positive pedagogical insights from an analysis of how universities responded to the crisis (e.g. [3]), there is a sense that educational institutions at all levels need to reassess the way that things are done, and take the opportunity to "build back better" [4] , in all aspects of provision.

Into this confused mix of qualified optimism and substantial concern for the problems that can be readily seen by educators, we would like to make a small pedagogical suggestion, namely that the educational establishment, at all stages, but especially at university level, rediscovers the concept of phronesis as an integral part of the learning experience. While not, generally, a familiar term used within the technical educational discourse of engineers and computing educators, the idea has a long history of development and draws together many strands of modern educational theory (e.g. see [5]).

Phronesis, which can be described as the application of practical wisdom or prudential judgement, is currently receiving a revival of attention within educational circles [6,7,8] where it has been proposed as an important element of the learning process, associated with ideas such as deliberation and evaluative judgement [9], as well as their practical expression [10]. The concept, however, is rarely made explicit in teaching, and the skills needed to exercise such judgement are often aggregated into other elements of the learning process. This is unfortunate as it provides a unifying idea around which to discuss the way in which students exercise their capacity for judgement and the implications for such judgement in practice [11].

The development of the new and challenging educational landscape, which has changed significantly due to the impact of Covid, suggests that it might be a good time to revisit this concept. This paper examines whether the classical virtue of phronesis, understood as the ability to apply judgement in a prudential, deliberative and evaluative manner, would be of greater use to students in this new environment, and, if so, what factors are driving this, and how we promote its acquisition by students.

We start by providing a brief overview of the role that phronesis plays in the educational experience and discuss the relevance of this kind of prudential judgement to the practical elements of the curriculum performed in academic and professional learning environments, especially with reference to authenticity in assessment. We argue that concepts found in these educational settings can be profitably applied in the disciplinary context of computing and engineering, where

many of the goals of the work are linked to a practical understanding of heuristic problem-solving. The application these ideas have found in teaching practices such as the use of real-world projects and the use of open-ended or ill-structured problems, are the competencies that are needed by students to overcome and mitigate the difficulties engendered by the loss of attainment experienced by many pupils and students over the past two years. We focus on the concept of deliberation and how it relates to ideas such as focus and attention as an intentional cognitive capability, drawing in ideas surrounding personal choice and agency. This places the concept at the heart of ideas about the change or evolution of identity from student to professional, and suggests that it should be of basic concern to ideas about educational growth and maturation.

We also note that, as we emerge from the measures put in place during the Pandemic, students appear to have fewer and more haphazard connections to both the university and their peers. There appears to be less structure and support for informal or spontaneous meetings between academics and students, and between students themselves, and so the exercise of deliberative competencies becomes more important, underpinning not just their academic environment, but their social and nascent-professional interactions as well. We look, therefore, at ways in which this support can be promoted within the university context.

II. Phronesis: A Brief Review

We start by giving a brief review of the concept of phronesis. While this concept is increasingly being rediscovered and discussed within the academic literature, it would not be true to say that it is a common term in the kind of scientific discourse that is found in Computing and Engineering educational circles, and so we spend some time in sketching its historical context and compare it to other ideas on which it borders.

A. Types of Knowledge

In Book 6 of the Nicomachean Ethics [12], Aristotle lays out a theory of epistemology and argues for the existence of three forms of knowledge: "*episteme*" or theoretical knowledge, "*techne*" or craftsmanship, and "*phronesis*", that is, practical wisdom or prudential judgement. While these forms of knowledge were termed “intellectual virtues”, the term "virtue" is (necessarily) imbued with its modern sense of a positive moral trait, or a good or admirable quality of ethical character, but rather as a disposition that make it possible for people to think, and act in a certain way. These dispositions inform the actions of individuals and allow them to act in a way that is appropriate to the situation in which they find themselves. In his discussion of these dispositions, Aristotle introduced a number of terms which distinguish what we would now call types of knowledge and form the basis of his epistemological theory.

The first of these, *episteme*, is a kind of propositional knowledge that is demonstrable, that is, it is legitimately derivable from more fundamental principles or universal considerations, and, as such, is context independent. Given the universality of these principles, it is tempting to see episteme as a precursor of modern "scientific" knowledge, and many translations do indeed use that word. However, it is clear that, when used in its original form, we cannot simply identity it with ideas of post-Enlightenment "science" which clearly did not exist at that point in time. It is true that we can trace a line of development from these ideas to categories of ideas about scientific knowledge but this development has taken place in modern times over the last couple of centuries and cannot naively be “read-back” into the idea of episteme in its original form. Indeed, in this original form, episteme aimed at the attainment of timeless or universal truth, rather than the more contingent ideas about modern scientific theory, and as such may be more linked with ideas found in mathematics or metaphysics. Nevertheless, it conveys the idea of knowledge sought for its own sake.

The second intellectual virtue is *techne*. This describes a form of knowledge expressed in terms of craftsmanship, and so is sometimes translated, in a modern context, as "technical expertise" or "artistry". This type of knowledge has been characterised as "knowing how" to do something and, since this depends on the situation in which the action is to take place, this form of knowledge is context-dependent, with the primary aim of the production of some kind of artefact, either physical (such as a sculpture) or, more generally, a state of affairs (such as when a doctor uses knowledge to produce good health in a patient [5]). The concept has been taken up in recent years as an antecedent of the idea of professional knowledge. Kemmis and Smith [7] state that it is the disposition to act in a true and reasoned way, relative to the standard rules of the discipline or profession involved. The result of this process is the making or production of something - what was classically called *poeisis* - the outcome of which could be precisely specified by the maker before engaging in the activity.

The third virtue, and the one on which we wish to concentrate, is that of *phronesis*, which Aristotle defines as ‘*a true and reasoned state or capacity to act with regard to the human good*’. It is often translated into modern terms as "practical wisdom" [5], "prudence" [8] or "practical reason" [9]. Whereas *techne* results in the making of some artefact, the goal of phronesis is the bringing about of a beneficial state of affairs using good sense and judgement. It differs from episteme in its focus on action, and from techne by its focus on the use of deliberation and practical wisdom rather that technical expertise. It incorporates the capacity for moral judgement, and cognitive understanding and insight, and, significantly, results in some kind of practical outcome which has an effect on its surroundings. It therefore underpins the capacity to develop practical understanding and the disposition to act wisely and justly within the world. Although not classed by Aristotle as a moral virtue in itself, the ability to evaluate the right end in a particular situation, and so make a wise or prudential judgement, is nevertheless aligned with the moral sense and is directed towards that same objective. The result of the process of deliberation is some positive action, and, consequently, phronesis has often been described as a disposition to "do something" (*praxis*) in contrast to the disposition to "make something" (*poiesis*) which characterises the other virtue of techne, although this is really just a shorthand summary of a more complex argument.

Despite this classification system, it was realised, even in classical times, that there is some degree of ambiguity at the margins of any consideration of this kind. Some activities or professions, such as medicine or navigation, in which right judgement would appear to play a significant part, are, nonetheless, characterised classically as techne and the dispute about assignment of medical skills to which form of knowledge, and why this is the case, is disputed by various authors (e.g. [13,14,15]). From the perspective of most 21st

century educational practitioners, these somewhat esoteric debates and discussion of the classical scope and exact meaning of the terms and are of limited interest. Nevertheless, the ideas themselves, and particularly their possible development and re-expression in terms of modern educational and pedagogical vocabulary, is something that is worthwhile, and serves to re-emphasise notions of contingency and context within the learning experience. For example, in this paper, we will look at phronesis and sketch out some ways in which it is a useful lens through which to see the result of student decision-making processes about the learning experience through the Covid Pandemic.

B. *Deliberative and Reflective Judgement: Phronesis in its Modern Guises.*

So where do we find engagement with these ideas in the modern philosophical, social science and educational literature? The answer to this question is that there has been a substantial reappropriation of these concepts in a variety of works, ranging from the phenomenological writings of Heidegger [16], through the philosophical hermeneutics of Gadamer [17], to the virtue ethics of Macintyre [18]. In an educational setting, the concept has been applied in a number of ways. For example, the notion of phronesis has been used to improve teaching practices by providing a vehicle for inferring the implicit arguments used by students to justify particular courses of action, e.g. Green [19]. It has also been used as a tool for understanding the competencies and thinking processes of both students and teachers, e.g. [11]. Central to these lines of thought is the idea of "deliberation" [20, 10] where parallels and similarities are drawn between the exercise of phronesis and the practice of reflective judgement as found, for example, in the works of Schön [21, 22].

This emphasis on the evaluative and inferential nature of the concept is also found in the work of educational theorists such as Dunne [5] who investigated the contextual nature of judgement, i.e. what one should do in a particular situation to accomplish a particular objective or goal. This focus on the concept of situational appreciation (or "attentiveness" as Smith [23] termed it) is also found in the work of Kessels and Korthagen [6] who developed an account of phronesis which emphasised "*the understanding of specific concrete cases and complex or ambiguous situations*". These works lead to a view in which phronesis, seen as the exercise of prudential judgement about, and evaluation of, contingent and contextual information, together with the ability to work with ambiguous or poorly-defined information, is central to the solution of ill-defined or open-ended problems.

Having given this review, it is worth addressing one point about the use of Aristotelian terms in this context. An objection could be raised that the use of such "archaic terminology" is redundant when we have a multitude of pedagogical terms in English which could act as perfectly good synonyms in a paper such as this. Indeed, the use of classical terminology in computing and engineering educational discourse might be seen as not just anachronistic but off-putting to the general reader. This, of course, is a reasonable point. Nor is this a question of terminological precision – educational concepts do not generally have precise borders. Consequently, where aspects of phronesis seem to be best represented by modern terms such as deliberative or prudential judgement, we have used them. Nevertheless, there is a sense in which using the original terms do draw a distinction between the activities of making and doing; something that that we often conflate, e.g. in competency literature. We therefore continue to use the word phronesis, where necessary, as a general term covering the variety of these kinds of judgement and processes of application to the world.

III. The Issue of Post-Covid Educational Environment

A. *The Context*

We have already alluded to the fact that the global Covid Pandemic has had a significant effect on the educational experience of school and university students, as well as the operation of the educational system in general. As one example of this, we consider the situation in the United Kingdom, specifically in Scotland. The school educational system in Scotland has historically been a source of national pride and has a high international reputation. It has also retained a distinct cultural identity distinct from the educational systems in other constituent countries within the United Kingdom [24,25]. Politically, education is an area of responsibility that has been devolved from the direct administration of the United Kingdom government in Westminster, to the Scottish Government in Edinburgh, and is overseen by its executive agency, Education Scotland. Qualifications at secondary school level are currently provided by the Scottish Qualifications Authority (SQA), the national awarding and accrediting body. Following the implementation of a nationwide lockdown due to Covid in March 2020, the SQA cancelled all summative national examinations for stage 5 to stage 6 pupils (generally, 16- to 18-year old) - the first time that this had occurred since the inception of the national Scottish system in 1888. These examinations were replaced by the award of grades based on results in preliminary (sometimes non-summative) assessments, together with predicted grades from teachers. This resulted in perhaps what could best be described charitably as a somewhat chaotic situation, the outcome of which saw central SQA moderation of the student academic results move the grades downwards in over 124,000 cases, affecting 75,000 pupils, only to have this downward change reversed a week later in the face of widespread criticism by pupils, teachers, and politicians. One consequence of this policy reversal was an unprecedented increase in reported year-on-year performance. Quality assurance considerations were deemed, by the Scottish Education Minister, to be "*outweighed by concern that young people [...] will lose faith in the system*". [26]. The following year, 2021, with the Covid19 Pandemic still ongoing, the SQA announced that all examinations for 16-year old pupils would be cancelled but those for 18-year old students would still take place. It is worth noting that it is these so-called Higher and Advanced Higher examinations which are typically used by university departments as the basis for decisions about potential offers of places on undergraduate courses and programmes of study. This announcement was subsequently followed by the declaration of a revised policy which cancelled all such examinations, with student grades being awarded based solely on the judgement of teachers. Following the announcement of another record year of high grades, and ongoing further difficulties with content provision and assessment arrangements for the next academic year, it was announced in June 2021 that the Scottish Qualifications Authority as well as the executive agency, Education Scotland, would be discontinued, although would maintain its current function

until replaced by unspecified successor organisations in 2024 [27].

While the disruption and uncertainty caused by the situation described above may be extreme, it is not dissimilar to the crisis in primary, secondary and tertiary/university education that has occurred in many countries due to measures taken to alleviate pressure on healthcare provision during the early and middle stages of the Covid Pandemic. There are clearly many significant issues entangled in the state of affairs described above and much research activity will undoubtedly be undertaken to explicate and interpret the effects on pupils, teachers, policy makers and other stakeholders over the coming years. An exhaustive discussion of the wide-ranging implications for schools, universities and colleges, and for society at large, is far beyond the scope of this paper. However, it is important to state this background so as to contextualise some of the ideas considered in this paper within broad social structures of post-Covid Pandemic educational practices. One effect of teacher-marked assessments has been the decrease in students' exposure to forms of problems which do not have convergent solutions. This is partly a pragmatic response to an increase in the teacher assessment burden but may also be traced to more politically problematic issues such as the use of widely publicised school performance ("League") tables in the secondary education sector. In most contexts, ill-defined problems are harder to solve than clearly specified and well-constrained problems, require greater scaffolding and are harder to assess. These all militate against their use in substantive assessment.

The changes in teaching, learning and assessment that have occurred over the past two years are arguably the most significant events in educational policy since the end of the Second World War, and will affect university learning environments for some considerable periods of time. These changes have occurred in conjunction with the rapid expansion of information technology that has occurred in the last two decades (and which itself was given further impetus by the Pandemic). It may well be that the aftermath of the Covid Pandemic, which already promises to be chaotic, is eventually seen as one of the most important periods of change, within the broad practice of education, since the start of the movement towards mass education of populations in the nineteenth century. Of course, as with any apparently "chronocentrist" claim to historical relevance, this is a bold conjecture, and we will sidestep its justification in this paper. Instead, we will concentrate on some of the more observable effects of the Pandemic on students and attempt to use the epistemological categories described earlier to examine how a focus on phronesis might be beneficial in the current changing and challenging educational environment.

B. Emergency Remote Learning vs Planned Online Learning

The chaotic nature of Covid and Post-Covid teaching and assessment practices, such as those described above in the Scottish context, has presented a range of challenges to students at both secondary school and university level, and has had observable effects on learning and wider aspects of student behaviour. The move to emergency remote learning has given traditional students (i.e. those who would have previously taken the majority of their course in an on-campus learning environment) a degree of educational autonomy that was previously approached only by distance-learning students, requiring them to engage with their learning activities in a manner which demands unprecedented levels of self-motivation and self-regulation [28, 29].

It should be stated clearly that while there are some superficial similarities between the practice of emergency remote learning and more "traditional" online learning practices - the method of delivery being the most obvious - the two activities are qualitatively distinct [30]. For example, in their paper categorising the important elements of instructional design applied to online learning, Mearns et al [31] identify nine dimensions of consideration when developing an online course. They discuss issues such as modality, pacing, student-instructor ratio, pedagogy, instructor role online, student role online, online communication synchrony, role of online assessments, and source of feedback. These factors, and sub-categories within each, give rise to a high level of complexity in the instructional design of such courses. Bernard et al [32] reported (in 2009) that planning, preparation and development time for a fully-online university course typically lasts six to nine months before the course is delivered and make use of elements of co-curricular engagement and other forms of social underpinning. Furthermore, they state that "effective online education requires an investment in an ecosystem of learner supports, which take time to identify and build." [31]. When successful, this provides students with a significant degree of institutional scaffolding around which they can foster effective self-regulatory practices.

By contrast, emergency remote teaching is a temporary migration of instructional delivery to an alternate delivery mode due to crisis circumstances. Confinement during the periodic lockdowns of the Covid Pandemic meant that students had to rely on fully remote teaching solutions for instruction and other educational activities that would otherwise be delivered as predominantly on-campus exercises. Moreover, at least at the start of the pandemic, there was an assumption that the delivery mechanism would return to that format once the emergency had abated. The primary objective was not to re-create a learning environment as part of a robust educational ecosystem, but rather to provide temporary and often limited access to instruction and educational support. Furthermore, this had to be done in a manner that could be rapidly implemented and was reliably available to students during the time of the crisis. The lack of preparation and the need for workable solutions meant that students needed to learn how to regulate their own learning in a very rapid way, without the help of effective institutional support structures. This, in turn, required them to develop cognitive, meta-cognitive and resource-management strategies [33] that facilitated the planning, monitoring and control of their own learning activities [34].

IV. The Challenges Faced By Students

A. Student Responses to Education in the Covid Pandemic

The discussion presented above suggests that students who are currently studying at university have been presented with significant challenges during the period of the Pandemic, and indeed this appears to be a commonly reported

issue by education researchers around the world. Numerous papers across a range of disciplines, educational stages and geographical locations reported increased instances of issues with student mental health [35, 36, 37, 38], lack of motivation [39, 40], physical symptoms such as sleep disorders [41] and feelings of loss (of control, of general academic and social experiences, and of social support) [42].

In response to these factors, Biwer et al [43] have attempted to investigate self-regulation of resource management strategies used by students when attempting to cope with the change in educational situation. They used cluster analysis to identify four student profiles which reflected different levels of successful adaptation to the change in learning environment. All students faced similar challenges, but students in the different cluster profiles coped with these challenges in different ways and with different degrees of regulatory success. Students of all profiles missed the personal contact with teachers and peers, and reduced opportunities for collaboration and interaction negatively influenced motivation. However, while some students appreciated the increase in autonomy and self-directedness (e.g. being able to study at their own pace), others struggled to manage their time, attention, and academic efforts effectively. We give a brief overview of Biwer's classification scheme.

- The most successful group, termed the "Adapters", appeared to fare much better under the changed circumstances. They appreciated the increased level of autonomy and self-directedness which was provided by the online setting. Being able to engage with teaching material at their own pace enabled these students to check their understanding and study at times when they were more productive. This positively influenced their attentional and effort regulation. Time and resource management activities were also enhanced with students reporting increased capacity to plan and organise their academic activity, leading to perception of greater levels of control. As with all profiles, adapters still missed the informal social contact with tutors and peers and found collaboration with other students more difficult online. These students also thought that online examinations caused more stress and higher workload. Interestingly, many students in this group described poor levels of self-confidence in conventional on-campus activity and so found the online setting conducive to studying at their own pace.
- The next group, labelled the "Maintainers", were reported by Biwer to have had a more diverse experience of the online learning environment. They were affected by the challenges to motivation and concentration generated by emergency remote teaching to a greater degree than the adapters but also appreciated the flexibility provided by off-campus working. They also reported missing direct contact with academic staff and with peers, and associated this lack of interactivity with a perceived deficit of institutional support.
- Moving on to lower levels of adaptation, there was a group profile which Biwer termed the "Overwhelmed". These reacted negatively to emergency remote learning, and the online learning mechanisms used to deliver teaching, reporting difficulties with the regulation of attention. Concentration and focus suffered due to distractions at home, being online, and not having access to the library or other study facilities. They also reported difficulties with regulation of effort, spending considerable amounts of time using a computer, for example, coping with poor internet connectivity. Motivation was also negatively affected because of lack of external structure and organisation. Reduced levels of socialisation and interaction with others enhanced levels of isolation and loneliness. While this group appreciated studying at home in a comfortable space, maintaining a daily routine became more difficult, and increased workload and stress were perceived as significant extra burdens, with students feeling unsure about changing assessment processes and lack of perceived support by the university.
- The final group was termed the "Surrenderers". These students experienced significantly greater levels of difficulty with attentional regulation, motivation, and time management, than those with the overwhelmed profile. Most, again, experienced a decrease in levels of motivation due to lack of interaction with others, as well as a perceived reduction in the level of overall academic experience. This correlated with a drop in their investment of effort and time in the educational process. In contrast to the overwhelmed, students with this profile did not invest as much time and effort in their studies and perceived increased opportunities for self-direction and autonomy as a burden. While they appreciated saving time from travel to university, and studying at home in a comfortable environment, the surrenderers had substantial difficulties regulating their resources during self-study, disengaging from external organisational structure such as timetables and lecture schedules.

This example shows that the issues faced by these students are not completely different from those faced by their predecessors on on-campus courses prior to 2020, but that they have been accentuated by the loss of direct access to support facilities that characterised much of the last two years. Students are thrown back on their own psychological and technological resources. While universities may, to a certain degree, be able to help with the latter, providing immediate support for the former is difficult, especially in the short term. Building up a student's capacity for self-regulation is not something that is amenable to a quick fix, and actions which promote and foster basic competencies in this area require time to embed in curricular and co-curricular structures.

The challenges faced by current students will also have an impact on incoming students although, as the measures put in place to halt the spread of the disease start to be removed, it is anticipated that some semblance of continuity with pre-2020 university life will start to reappear. However, this "return to normal" may well be superficial as a number of factors suggest that the student cohorts that enter university during this phase, may well be at a significant disadvantage to previous cohorts due to their particular experience of secondary education throughout the Covid period.

In the Scottish context described above, for example, incoming students face a number of additional challenges that can be traced to the changes in delivery and assessment processes that have occurred since 2020. Among these issues, the following can be identified:

- Many students lack an experience of having to sit externally marked, time-limited, summative examinations. Their experience in secondary schools means that students often enter university with little experience of the degree of formality usually found in higher education assessment practices. Depending on one's educational perspective, it might be the case that this may be thought a good thing especially if one believes such assessment instruments to be inappropriate to evaluate student learning in a holistic way. However, even if this is the case, institutional change is often quite slow and there will probably be a significant continuation of formal summative examinations within universities. The sudden appearance of a cohort of students who may well never have undertaken such activities will be problematic.
- Reliance on virtual teaching and support often means that students may lack basic knowledge about what was previously thought of as fundamental on-campus educational activities: lectures, tutorials, seminars, and labs. This extends to an understanding of how they operate, their prerequisites in terms of the amount of prior study that they demand, and their wider purpose within the overall educational programme.
- The expectation of immediate access to information via the internet, is something that has been reinforced throughout the Pandemic. However, because of lack of access to teaching staff acting in a mentoring or guiding role, this has taken place without a commensurate assimilation of competencies to prioritise this information in terms of relevance to the task in hand.

B. The Role of Phronesis

Why should these problems require an approach to education which stresses phronesis? In order to be successful, students will need to be able to exercise a metacognitive capability for self-regulation [28, 44] within the learning environment, as well as a psychological disposition for self-reliance. The former underlies the cognitive abilities for self-direction and, ultimately, self-efficacy. Zimmerman [28] describes the self-regulation cycle in terms of forethought or planning, performance and self-reflection. In each of these, we see applications of phronetic activity: goal setting and strategic planning in the forethought phase, attention focussing in the performance phase and self-evaluation in the self-reflection phase. In each of these case, the learner needs to deliberate and make practical judgements based on their knowledge and experience in that situation. Goal setting relies on the ability to discern what is appropriate, attention focussing on the ability to judge what is important, self-evaluation on the capacity to reflect on context and make suitable judgements about personal performance and how this can be moderated. In that sense, we would contend that phronesis is a fundamental underpinning of these processes.

The second personal attribute is linked to the conceptions of resilience and self-reliance. Recent research has tended to characterise these concepts as manifestations of perseverance or persistence in terms of academic tenacity [45]. Writing from a perspective of Self-theory, Dweck uses the term "academic tenacity" to denote the quality of self-reliance which manifests itself as "*a mindset that looks beyond short-term concerns to longer-term or higher-order goals, and so withstands challenges and setbacks to persevere toward these goals*". Dweck's emphasis on learner mindsets not only brings together aspects of personal epistemology with identity theory, but also considers the skills that are needed to overcome challenges and setbacks.

In both these cases, an underlying presupposition for the concept to be relevant and applicable in an educational context is that the learner has the ability to recognise beneficial strategies and act on them. This is, in essence, an application of phronesis, involving as it does, the integration of medium and long-term goal-seeking strategies and evaluative reasoning about priorities.

C. An Example from a Final Year Undrrgraduate Computing Course

With regard to application of these activities, we give an example from the Computing curriculum of the Robert Gordon University, namely the final-year project course unit which involves students engaging with an extended, individual, analytical or software development exercise lasting the whole of the academic year. This is similar to so-called "capstone projects" which are found in many bachelor-level degree courses. The ability of a student to engage with such an activity, under appropriate supervisory guidance from an academic member of staff, clearly depends on a number of technical and professional skills, and while the capacity to build technical solutions to computing and IT problems is one important element in achieving project goals, the ability to marshal required resources, devise project plans and adopt suitable time-management skills is also crucial to the student success.

During the Covid Pandemic, the loss of on-campus teaching meant that access to complex, technical hardware, as well as technical support from academic faculty, was provided in a somewhat limited way. Moreover, the social and economic disruption caused by the Pandemic meant that client-based, "real-world" projects were severely limited in scope. While it may be thought that the ability to demonstrate professional or non-technical competencies would be less affected than the demonstration of more technical skills in such circumstances, it became apparent that, for many students, this was not the case. This was due to a number of reasons. The first of these was the fact that, often, professional skills were demonstrated using the technical or client-based medium of the project as the main context or environment. The ability to assess the importance of, say, competing functional and non-functional requirements when drawing up a requirements analysis for a project, is clearly anchored in the technical or client-centric basis of the project itself. It was found that even a partial loss of this context, such as the loss of immediate access to technical equipment or access to a particular "real-world" context (e.g. clients, or subjects which approximated them) could have a significant effect on students' ability to draw out lessons in areas that required

prudential judgement. If we consider the example of the tasks needed to perform an appropriate requirements analysis for such a development project, the competencies needed for this include the ability to select and rank information, especially information coming from priority sources such as users, and to optimise outputs based on strategic concerns in the face of conflicting requirements. One reason that any demonstration of such competency is difficult is that it relies on an output – say, a formal project specification which incorporates the statement of requirements – but that output does not necessarily reflect the process that was undertaken to produce it. This is just another aspect of the familiar product-process issue.

From discussion with students, it appears that a loss of immediate context (e.g. access to industrial or academic clients) in which to apply suitable adjudication competencies, including those associated with discrimination and reflection, produced a range of responses which broadly matched the classification introduced by Biwer et al.

- Some students were able to demonstrate the skills needed to develop requirements despite lack of access. While reporting that they missed the social interaction with clients (in a quasi-industrial project setting) or with academics (in a more research-oriented setting), they were nevertheless able to demonstrate appropriate autonomous behaviour when it came to abstracting requirements.
- Some students reported that the loss of immediate access to advice and support led to a lack of motivation and, while this could potentially have had a significant effect on their ability to carry out suitable analysis, this was mitigated by careful external regulation of tasks, e.g. by project supervisors.
- In line with their response to other educational activities, some students reacted to the need to demonstrate specific project subgoals, such as drawing up a requirements analysis, by attenuating the difficulty of the task, e.g. narrowing the focus of activity to a substantially weakened set of activities, or conversely, widening the focus to include a range of peripheral or unimportant aspects of the exercise. While not necessarily inducing a catastrophic response to the task, in the latter case, it did mean that much effort was directed to areas which were not of primary concern to those who would ultimately assess the exercise. Again, this was partly mitigated by careful attention from supervising academics.
- Finally, some students were not able to motivate any substantive engagement with the process and this led to a reduction in the work done and subsequent abandonment of the project and often withdrawal from the course, even though it was the last year of study. While the extreme lack of academic engagement in these cases meant that large amounts of qualitative data for this particular case is difficult to obtain, discussion with the relatively small numbers of students who did respond to supervisory questions suggested that these students were the subjects of multiple, "system-wide" failures in coping rather than an inability to manage isolated, individual issues.

D. Some Observations on the Mitigation of

The observation that these general classes of students exist is not surprising as, clearly, one could always develop some kind of categorical model based on effort or motivation or some other kind of quality, in which more engaged students did better and those who engaged least were seen to do worst. However, that is not the main point that we wish to make. Firstly, it should be noted that, in general, students who divided into the groups described above, exhibited the same general features across other subject areas within the final year. While more work needs to be done in cross-correlating individual academic responses to course units during the Pandemic, it does appear that the features described by Biwer et al did hold for the specific areas of developing what might be called "adjudication competencies" within the area of final-year projects. However, on an optimistic note, for two of the categories, performance in developing and demonstrating these competencies was enhanced by appropriate academic intervention to direct or refocus student activity on more productive strategies to produce the required outcome (in this case, for the development of project requirements). Moreover, students reported that the exercise of competencies to analyse, evaluate, reflect in a concrete context helped with motivation and hence with engagement.

While activities designed to promote engagement with the process of deliberative judgement, and associated decision-making activities, in the face of ambiguous or uncertain information, are always embedded within specific modules or course units, the tone is usually set by course-level specifications within academic programmes (where we are using the UK designation of an undergraduate degree as a course of study made up of individual modules of study). The solution of open-ended or ill-defined problems is hard and the need to introduce students to effective scaffolding when confronted with these types of problems is made more difficult when such learners do not have a history of engagement with this kind of activity. Qualitative evidence from end-of-year student results in the School of Computing at Robert Gordon University, UK, suggests that the Covid Pandemic has exacerbated this problem at all undergraduate stages, with early-stage students faring worst when confronted with the types of problems requiring deliberation and prudential judgement. Directors of Study/Academic Programme Leaders will need to consider in detail how to enhance these activities on a course-wide basis to deal with new students who do not have a personal experience of this kind of activity.

V. CONCLUSION

In this paper, we have sought to show that the concept of phronesis is an important element in the educational process. The exercise of this faculty through the activity of deliberative judgement is a fundamental component of the kind of pedagogical approaches that will be required as students re-engage with university education after the Covid pandemic. These approaches should allow students to mitigate the kind of deficits that have occurred in the series of lockdowns that disrupted school education over the past two years. The use of deliberation and evaluative or interpretive judgements, together with the requirement to justify action based on them will be needed as students become re-acclimated to university teaching and learning processes.

An important aim of university education [46] is getting students accustomed to make, defend and criticise such

judgements. This demonstrates the contingent nature of knowledge and also provides the students with the opportunity to take responsibility for those judgments and consequent actions. If universities wish students to make a successful transition to a more traditional university learning environment, they need to allow students to demonstrate the capability of making and defending judgements, which means that students need to be given the opportunities to develop that skill requiring its provision to be embedded into the curriculum. The use of phronetic activities designed to enhance students understanding of the contingent, context-dependent, situational knowledge is a key feature of engineering problems requiring the ability to make contextual, practical, prudential and reflective judgements based on deliberation of alternatives. By highlighting this approach, as an identifiable part of the computing and engineering curriculum. The more widespread use of embedded pedagogies, students can be given the chance to exercise their faculties of judgement.

From the discussion above, we note that, in the context of a final year project course unit, while the students under consideration showed the expected, general range of reactions to the Pandemic in terms of motivation and engagement, this response could be mitigated by academic intervention aimed as refocussing attention on the required evaluative tasks. More work will be forthcoming on this, but we believe that it highlights the fact that exercising the capacity for evaluative judgement – for phronesis – can help with student motivation and to overcome issues related to engagement following the Covid Pandemic.

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