



ADVANCING KNOWLEDGE ECONOMY THROUGH EDUCATION AND RESEARCH SKILLS

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Abstract:

The knowledge economy is a system of consumption and production that is based on intellectual capital. Specifically, this refers to the ability to capitalize on scientific discoveries and applied research including research studies at the university. To develop a successful post-graduate program in research needs a robust and sustainable research environment. A guideline named "Best Practices for PhD Training" was produced by the Organization for PhD Education in Health Sciences in the European System, a European platform to promote best practices in PhD education in health sciences. The extensive advice and suggestions made in the guidelines apply to all aspects of PhD and research programs, of which supervision is a crucial part. The success of a thesis depends on a productive supervisor-student relationship built on respect, accountability, and engagement. Active researchers who obtain training to hone their overseeing abilities should serve as supervisors. They act as both scientific and moral role models in academic life. The employment of a second supervisor in addition to the primary one is strongly advised to boost monitoring student development more effectively and to prevent interpersonal disputes. The obligations of the supervisor should be outlined in institutional regulations. The task could be more clearly defined and may serve as a beginning point in a contract created by the institution and signed by the supervisor and the student. Grievance methods must be plain and obvious in the event of a conflict. Students' professional development should be supported by their supervisors, who should also help them become autonomous researchers. Quite a number of surveys revealed considerable dissatisfaction among students with their supervisors. There is a great deal of strain due to performance pressure on both students and supervisors. Students worry about their future employment opportunities. These stress spots should

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be taken into account by institutional regulations to improve the welfare of both professors and students. Small-group instruction and learning have become increasingly popular in medical school as a tool to assist research students with their studies and promote deep learning. Postgraduate learners can exercise their higher-order thinking and cognitive abilities by researching the problems with undergraduate medical student supervision. Thus, encourages self-motivation while as a postgraduate researcher and fosters adult learning, accepting responsibility for one's own development, and adult learning.

Keywords: learning, education, research management, postgraduate, SoTL

1. Introduction

The focus of a post-graduate program is research, but not lectures alone. Developing a successful postgraduate program, needs a robust and sustainable research environment. The dissertation, which demonstrates the student's contribution to scientific knowledge, and the graduate, who afterward becomes an independent researcher, are the two main results of graduate education. Postgraduate candidates work under supervision, more as individual researchers rather than students. The "students" supervision is essential because it significantly impacts both outcomes. Any institution's supervision activity has significant cultural components that stem from regional traditions and are entwined with general scientific conventions. The postgraduate education is typically led by a principal supervisor, with or without the assistance of ancillary committees. Some institutions set up a thesis steering committee that meets with the student regularly to monitor the progress of the thesis work (University of Oldenburg, Steering Committee, 2024). The committee oversees the scientific parts of the thesis and aims to take a second, hopefully, more critical look at the data produced. The supervisor serves on this committee as a member and coordinator.

After the committee meeting, a positive report is a signal to start the follow-up work plan. In other instances, the supervisor is the only one accountable for keeping track of the thesis' development. Different universities use different methods to evaluate how the thesis work is progressing, and these methods are influenced by historical and cultural factors. In any instance, the supervisor's contribution to the student's performance is crucial, and the effectiveness of the supervision is largely dependent on the supervisor's suitability for the job (Nwosu *et al.*, 2021). Apart from pursuing the research endeavour, research candidates are also involved in mentoring and guidance of research projects undertaken by undergraduate students at the university level.

2. Literature Review

2.1 Organization for PhD Education in Health Sciences of European System

Organization for PhD Education in Health Sciences in the European System (ORPHEUS), which was established in 2004 and is focused on allied health sciences, is the largest non-

profit academic platform that advocates for the finest methods in doctoral education (ORPHEUS, 2024).

More than 100 member institutions, the majority of which are situated in the European Research Area, are represented by ORPHEUS. By creating a shared understanding of the third-cycle education in accordance with the Salzburg Declaration, ORPHEUS facilitates the mobility of PhD graduates in the health sciences in this regard (European Universities Association, 2010). A task group was established in 2012 by ORPHEUS, the Association of Medical Schools in Europe, and the World Federation of Medical Education to establish the requirements for PhD programs in biomedicine and the health sciences. To further deemphasize the "one-size-fits-all style" of graduate studies, an update was recently issued in 2019 with the title "Best Practices for PhD Training" rather than "standards" (ORPHEUS/AMSE, 2019).

"Best Practices for PhD Training," a manual that can be used as a reference, covers all facets of PhD training, including the research environment, administrative organization, thesis, and supervision. It also directly tackles the management of doctoral institutions. Three subheadings are used to discuss each part of the PhD program: (a) fundamental suggestions, initially referred to as "standards," (b) ideas for improving the quality, (c) annotations, which are a series of clarifications about the various aspects in question. On the basis of the recommendations, the document can also be used as a benchmarking tool to compare other institutions. Since 2017, ORPHEUS has made available a labelling program to assess how well its members adhere to the advice given in the best practices guideline. An initial self-evaluation phase is part of labeling. The self-evaluation form may be downloaded and completed at any time by any institution. Institutions can then choose to have their self-assessment forms reviewed or request an on-site examination of their PhD programs by ORPHEUS in order to be certified as complying with best practices. Such initiatives also attract the attention of government authorities as, through such self-evaluation and labelling certificates, many institutions fulfil the requirements of the national quality assurance schemes.

2.2 Supervision

The thesis should, according to ORPHEUS, be the result of 2.5 years of full-time research and contain enough information for three related peer-reviewed publications. Such an undertaking needs a constant supply of research information. As a result, the ability of the supervisor to oversee a graduate student is closely tied to his or her capacity for conducting research. Usually, supervisors are selected from among the institution's active and somewhat experienced members. Being actively involved in research is referred to as being active. Institutional regulations frequently outline their responsibilities and roles. However, beyond the educational prerequisites and some fundamentals, the competencies of a supervisor are rarely stated explicitly. The best practices paper from ORPHEUS places a strong emphasis on the supervisor's contribution to the success of PhD programs and makes important recommendations to enhance supervision quality and fortify institutional structures.

The setting for research is varied. It takes a lot of time and work in various contexts to become an excellent researcher. It requires a thorough comprehension and evaluation of current scientific issues. In academic life, a supervisor acts as a role model in both science and ethics. Supervisors should be able to offer guidance on basic scientific topics in addition to their specific expertise in that field. Training young researchers would surely benefit more from a well-coordinated administrative structure. The majority of doctoral degree-granting institutions in Europe have an oversight system on thesis supervision, according to a recent survey on the structure of doctoral education done by the European Universities Association-Council for Doctoral Education (European Universities Association, 2010). Only 11% of the universities that responded reported that supervisors are primarily in charge of PhD education. Clear and transparent bylaws and rules must cover every aspect of the PhD program.

Graduate students require direction as they strive to become researchers. In graduate education, a positive student-supervisor dynamic is viewed as a key advantage. Mutual respect, planned and agreed-upon shared responsibility and joint effort from both parties are all necessary (ORPHEUS/AMSE, 2019)

The supervisor-student relationship is a critical factor in determining the well-being of students, according to a UC Berkeley survey that confirmed this (The Graduate Assembly, 2014). A supervisor's capacity "to support the full growth of a student" is equally important to the doctoral process as their researcher skills. According to traditional doctoral education, the student will be guided through the dissertation with complete academic freedom by an academic mentor, much like the traditional master-apprentice system. There is a power gap between the supervisor and the student because the supervisor represents the institution and is in a higher rank. The gap should eventually close as the study goes on, and the student and supervisor should be on equal footing. From the supervisor's perspective, managing this relationship requires a particular set of abilities. Supervisors are under great pressure to publish in a performance-driven culture, which frequently leads to burnout or psychological breakdown (Wilcox, 2014).

These circumstances increase the burden on the kids as well. The workload of a supervisor should be proportionate to their overall workload. Students in big, high throughput research groups may quickly slip from the supervisor's view and instead interact with their surrogates, i.e., post-docs or other middlemen. Such circumstances cannot be considered adequate monitoring. Others might lose their way and fail, even though some students adjust to this situation and carry on with their jobs despite the lack of proper supervision. On the other hand, in small research groups, there is a chance that the relationship with the supervisor will become overly close and the students will feel confined. The employment of a co-supervisor who supports the primary supervisor in both situations may be a solution to reduce conflict. Additionally, the collaborative character of the research frequently necessitates a supervising team's intervention rather than just one. Although the relationship between a supervisor and a student has traditionally been seen as purely academic, greater involvement from industry has changed this perception and allowed supervisors from that area to participate in thesis

work. A specific amount of office time should be set aside by supervisors for meetings with their students. These in-person meetings should be scheduled in advance and be scheduled on a regular basis. The minutes of meetings are useful tools for tracking the student's and the project's progress. As the project develops, the student must become an independent researcher. However, students frequently participate in multiple projects at once without making a significant intellectual contribution, serving merely as technicians. Supervisors must assist students in formulating their research questions and carrying out their research projects. Honest and impartial input regarding the student's progress is part of proper supervision. The thesis should conclude with evidence that the student is the primary intellectual input. The change from student to colleague could lead to unforeseen conflicts that endanger the thesis. To cope with the non-scientific parts of the PhD program, several universities assign a mentor in addition to the supervisor. The department or field of the thesis project is not always considered when choosing mentors. They must, however, be reputable, experienced, and part of the academic community with strong communication abilities.

The supervisor-student connection may not be the only source of the students' worries about their careers and potential for sadness throughout their studies (The Graduate Assembly, 2014). It is not unexpected that most students seek advice for their career options more frequently from internet sources than from their supervisors (Woolston, 2017). This is frequently true for jobs outside of academia. In order to present their students and aid in their integration into the scientific community, supervisors must have both local and global scientific networks. The motivation and growth of the students are greatly influenced by feeling valued and being a part of the supervisor's academic life. In this aspect, supervision may be beneficial for the students' long-term goals. But, the majority of respondents to a recent international study of more than 2000 graduate students from a variety of backgrounds did not concur that their primary investigator or advisor is a benefit to their academic and professional careers (Evans *et al.*, 2018). They didn't think their mentors gave them enough help, either. Unsurprisingly, the results of the same survey show that 41% of graduate students reported having moderate-to-severe anxiety, a figure that is significantly higher than the 6% figure for the general population. Good scientists are not always effective managers, but with practice and training, they can become more effective managers. Institutions should create administrative frameworks to track the supervision process as well as training programs for supervisors. More and more doctorate universities have strict guidelines for faculty members who want to supervise students. While most schools permit students to select their mentors, not all faculties are permitted to have students unless they can demonstrate their competence. Institutions tend not to meddle in the relationship between a supervisor and a student. Once the match is set, breaking it up causes a lot of issues. However, it is also necessary to have a clear procedure for resolving disputes between parties. More schools have recently adopted the execution of a formal contract between the student and supervisor to specify relative roles and responsibilities, driven by some American and Scandinavian colleges. A significant 39% of respondents to an online poll performed in

2016 with participation from over half of the ORPHEUS member institutions reported the presence of such a contract in their institutions (Orer and Sulaieva, 2017).

2.3 Teaching and Learning in A Research University

The relevance of the educational program is a major problem for curriculum designers. This is reflected in the information given to students, whose perspectives are crucial in bolstering the information they get during their scholarly education. Additionally, a variety of efficient teaching methods are needed to improve the delivery of applied medical science courses in year 2 and 3 of graduate programs to professional students, in health education (Kofi, Dickson & Ocansey *et al.*, 2021).

When students feel that their classes are not relevant to their studies, they frequently experience problems including lack of motivation and increased stress (Meşe & Sevilen, 2021).

Students' performance has been demonstrated to be improved by learning interventions that are directly based on their needs, encourage student participation, and are mostly student-driven. At medical universities in Africa, researchers who are engaged in postgraduate programs participate in teaching sessions for undergraduate students. Despite a heavy course load, a research university's emphasis on student-centered learning within the context of integration presents a number of difficulties. The fact is that the system favors teacher-based activities, assessments based on regurgitation of learned content, and semester exams that are norm-referenced to grade students despite the curriculum mandating integration and student-centered learning. The majority of students simply develop passive learning habits, making the abrupt shift from higher secondary school (natural sciences) to a research-based university, challenging and stressful for many students. As their academic demands rise, students understand that they must acquire the necessary learning skills. Even the brightest and most intelligent students occasionally become frustrated, as shown by their need to retake a year of school, take additional exams, or even face some detrimental issues (Baranek, 1996).

2.4 Assessment Methods

When it comes to evaluating pupils' performances, there are three steps involved:

Setting the standards for judging the classroom's work; choosing the appropriate classroom data to submit for evaluation against the testing standards; and determining the degree to which the standards have been satisfied in the classroom. In all three assessment procedures, the teacher has historically acted as the agent. The teacher makes the final determinations on whether the assessment criteria were met by determining in advance that the evidence for learning consists of correct answers to a series of questions that, in the teacher's opinion, again address and represent the essential core content of the course being taught. Students can and should participate in each of the three phases (Harris & Bell, 1986; Boud & Brew, 1995). In a learning contract system, students are involved in discussions with the teacher on possible criteria, which need not be the same for every student. In the same way that they choose the evidence to be judged against the

criteria for portfolio assessments, students can also be involved in choosing the relevant evidence from their classrooms to submit for evaluation against the testing criteria. Finally, students can also participate in the summative assessment by determining the degree to which these requirements have been accomplished in the classroom. This can be used as a teaching or learning activity as well as an assessment task. It can be self-assessed (SA) or peer-assessed (PA). Their evaluations must be factored into the final grade. All of these options are critical for discussion. Additionally, self- and peer-assessment offer TLAs that focus on essential yet frequently underappreciated facets of university student learning:

- 1) Firsthand knowledge of the standards for quality learning: All students should be quite aware of the standards for quality learning, but when the teacher sets the standards for learning, chooses the evidence, and assesses the student's performance in relation to the standards, the students may be unsure of what they ought to have been doing in college and where they made mistakes. The pupils find it far too simple to simply accept the teacher's evaluation and stop considering their own performance. Knowing what the requirements actually entail, they ought to participate more actively in clarification. They need to learn to apply the criteria, to themselves and to all others.
- 2) Teaching students what is good evidence may not engage them; instead, they should actively participate in the process of choosing it.
- 3) Determining whether a performance or product satisfies the required standards is essential for professional action to be successful in any area of education. Professionals are required to assess both their own performance (SA) and others' performance (PA). Professionals claim that their undergraduate education is particularly weak in learning experience (Boud & Brew, 1995). According to Brew (1999), students must be able to tell good information from bad because they are currently dealing with an amazing overflow of information from the internet. This is a crucial ability for lifelong learning in a university context. Alternatively, education is about empowering learners, and assessment can be used to play an empowering role. There is a critical need to adopt a more scientific approach to specifying and assessing academic standards in higher education institutions (Coates, 2010). Conventional assessment, on the other hand, disempowers all learners (Leach *et al.*, 2001). The phrase "assessment" in the context of education refers to the vast range of techniques or instruments that educators employ to assess, gauge, and record a student's level of academic preparedness, progress in their learning, acquisition of new skills, or educational needs.

While tests are often associated with assessments, such as the standardized tests created by testing companies and given to large student populations, educators frequently use a wide range of assessment tools and methods to gauge everything from a four-year-readiness old's for kindergarten to a student's understanding of advanced topics in twelfth grade. Similar to how academic classes serve a variety of purposes, assessments are frequently made to gauge a student's proficiency in a particular topic or skill that the teacher plans to teach or their capacity for understanding and analyzing a

variety of texts and readings. In order to give specific academic support, educational programming, or social services, educators might use assessments to pinpoint each student's deficiencies and strengths. Additionally, a variety of entities and individuals, including teachers, district officials, colleges, commercial businesses, state departments of education, and groups made up of both these groups and educational institutions, create the majority of assessments (Assessment, 2015).

2.5 Reliability and Validity of Assessment

The fact that qualitative evaluation is frequently "subjective" and "unreliable" is a common critique of it. The debate about the measurement model is at hand. Let's change the wording such that reliability and validity can be used to describe both assessment models.

The initial queries are:

- 1) Can we trust the assessment results, do they frequently hold up?
- 2) Are they frequently valid and are they assessing what they ought to be examining?

In the measurement model, reliability means:

- **Stability:** The requirement that a test produce the same outcome repeatedly, regardless of who administered and graded it. Giving the same test to the same group once more to check if the results are the same is the process of test-retest reliability.
- **Dimensionality:** Because all test items must assess the same attribute, the standard metrics of dependability include: Internal consistency, split-half (Cronbach α).
- **Testing procedures:** Each testing session must be conducted under standardized circumstances. Here, reliability is viewed as a test-related characteristic. Similar tests are designed, built, and applied within a complex framework of parametric statistics, which necessitates the fulfillment of a number of presumptions, such as the need for the score distributions to be normal or bell-shaped. However, the standards model does not use these ideas.

Being able to rely on the assessment results involves some queries:

- Does the same person consistently pass the same judgment on the same performance when judged on two separate occasions?
- Inter-judge reliability: Do different judges consistently reach the same conclusion while evaluating the same performance?

Since in this case, consistency of judgment on the part of the teachers or judges rather than the test itself determines reliability. The criteria need to be spelled out in what is now known as grading criteria or rubrics, which are simply unambiguous criteria of grading standards. This insists that they are aware of their framework of judging and how to use it. Being extremely clear about what we are doing, the learning outcomes we seek, what will serve as the evidence for those outcomes, and why is more important here than using statistical processes to ensure reliability. In other words, effective teaching requires trustworthy assessments.

To demonstrate that the characteristic being measured behaves as it should if it were being assessed accurately, the test must be validated against an external criterion

according to the measurement model. The results can then be used to forecast an independent test outcome or to correlate the results with results from another benchmark test. Contrarily, in the standards approach, the test's alignment with the entire teaching context and syllabus i.e., the interpretations and purposes to which test results are put, is what constitutes validity (Messick, 1989). The test results would be invalidated, for instance, if students learned model answers by heart while taking an exam. An assessment task that is aligned, or properly criterion-referenced, is valid, but one that is not aligned is invalid. The judgment serves as the connecting thread between the ILOs, the teaching/learning environment, the assessment activities, and their interpretation. About reliability and validity in qualitative assessment, there is a lot of consensus (Frederiksen and Collins; 1989, Moss, 1994 and Shepard, 1993).

2.6 Pivotal Concepts in Assessment

When considering and putting constructive alignment into practice, several concepts are essential. Decontextualized assessment is more suited for declarative information while authentic assessment actively engages the students with functioning knowledge in its context. The summative assessment should be of the entire activity, not the sum of its parts. Formative feedback should be analytical by letting students know how effectively they are handling different aspects of the assignment. Students must participate in all levels of assessment, including peer and self-evaluation because open-ended assessment assignments allow for unexpected, desirable, and varied outcomes.

2.6.1 Reliability and Validity

Qualitative assessment techniques are criticized by measurement modelists as being "subjective" and "unreliable." However, they overlook the fact that the ideas of validity and reliability are not the sole purview of number crunchers. As the quantitative scaffolding is removed, we discover that ideas about validity and reliability mostly depend on the teacher's fundamental professional duty, which is to assess the level of student learning.

2.6.2 Measurement Model of Assessment

The individual differences psychology field, which is focused on quantifying stable individual traits so that they may be compared to one another and to population norms, served as the inspiration for the measurement model used in educational evaluation. Anyhow, a lot of issues arise when using this paradigm to evaluate educational achievements. Although marking is universal and has unacceptable implications for the nature of knowledge, most procedures derived from the measurement model are still used in current practice. Separating assessment from teaching also ignores alignment and imposes a separate culture of assessment as distinct from the culture of teaching and learning. Grading on a curve makes students compete for higher grades. Students receive strange messages from the measurement model about the nature of knowledge and about how to prepare for assessments at school in a way that only promotes surface learning.

2.6.3 Standards Model of Assessment

In the ILOs and grading system, the standards model of educational evaluation specifies the types of knowledge that must be attained at the conclusion of each teaching session. The framework requires more discretion on the part of the teacher than does quantitative evaluation alone when determining how closely the students' performances fit the ILOs. According to the ILOs, the assessment tasks had to be "genuine," requiring a level of performance from students. Thus, the standards-based methodology can be summarized as an assessment of student learning as well as an assessment of learning for learning. All students are encouraged to be more self-reflective about their learning at school by having a clear goal and being aware of the standards expected for each grade. The standards model of assessment aims to determine what has been learned and how well it has been learned by measuring changes in student performance as a function of learning. Criterion-referenced assessment (CRA) is one that reports assessment results in terms of how well a person meets the established learning standards. This approach is appropriate for use in assessments at schools and universities (Taylor, 1994). The goal is not to identify students in terms of some attribute when developing constructively aligned outcomes-based teaching and learning but rather to identify performances that reveal what has been taught and how well. Because each student is unique, unlike in norm-referenced assessments, the results of one student are quite independent of those of any other student. R.L. Thorndike, an educational psychologist, said explicitly in 1918 that criterion-referenced assessment (CRA) would eventually replace norm-referenced assessment (NRA) in public schools (Airasian & Madaus, 1972).

Although his prognosis was incorrect, Thorndike was somewhat correct. There is still the lingering notion that education is a selective activity that takes place in schools and that norm-referenced evaluation is the way to go. However, even when this concept is implicit, parametric statistics are used in school to create and administer tests, verify reliability and validity, and evaluate and report test results. The normal curve was created using the biological assumptions of polygenetic inheritance, which were considered adequate for use in educational assessment. As previously stated, correlation statistics and standard reliability and validity tests, which presuppose that test results are normally distributed, are completely unsuited for use in classroom evaluation. Although the reliability and validity of evaluations are significant, the standards model gives them various meanings.

Small group talks give graduate students, a better opportunity to assess their own learning, enabling them to develop self-direction and independence from their advisors (Walton, 1997). The colloquium program for the academic year 2024, was held on an online platform from January 22 to February 2, 2024, by elite scholars at Africa Research University in Lusaka, followed by research guidance and mentoring. Critical topics like Introduction/Dimensions of research and paradigms, understanding of qualitative, quantitative & mixed research methods, selection of topics for research, proposal writing, academic writing, analysis methods, and publishing research data were discussed. Nearly 90 PhD and MPhil students from across 15 different African nations, participated and presented their research work in this first colloquium of the year 2024. All registered

students were encouraged to select a day and time during the conduct of the colloquium to present their work. Participants prepared PowerPoint notes and presented their research works at selected times as per the table list. My master's in education research study proposal titled as "Comparing Mental Health Scores of Graduate Medical Science Students: Rethinking Higher Education by a Cross-Sectional Investigation Across Academic Years" was presented with due respect to the elite professors and scholars of Africa Research University on January 23 at around 11.00 hrs in the morning. This research paradigm of my study comes under positivism with a deductive approach since it involves the testing of theories and hypotheses using quantitative methodology and statistical analysis of data from survey-based questionnaires as instruments.

Hence this paper elucidates the importance of various teaching and learning strategies implemented for graduate students during the pursuit of scholarly research at Africa Research University, Zambia. This research paper aims to study the scholar's perception of the effectiveness of the teaching and learning process during the study period of the Master's program in educational research.

3. Conclusion

A unique perspective is needed about learning and assessment, on what the research students find perplexing situations in academics and provide valuable insight into the reasons for those difficulties and the strategies that students use in response to academic hindrances. Notably, it is indicated that students, in recognizing their difficulties and the reasons for them, can implement effective learning strategies to overcome them during their academic learning for doing short-term research projects under the mentoring and guidance of postgraduate candidates, thus displaying resilience in the face of these challenges in learning. Various models of teaching and learning assessments have to be implemented based on the learning needs of students. This highlights the need for students to be both encouraged to reflect on their adaptive learning and provided with opportunities to do so, to assist them develop an awareness of both cognitive understanding and their learning processes. Supervision skills and steady research activity are two essential assets of a PhD supervisor. Formal evaluation of the supervisor's performance is now part of the routine administrative practice in some institutions. Only those who get an administrative green light are allowed to accept new students. However, institutions also need to create an efficient and productive research ecosystem, provide adequate tools to support career development and promote the well-being of the students as well as their supervisors.

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Conflict of Interests Statement

The author declares no conflict of interest related to the contents of this article. The views and opinions expressed in this article are those of the author and do not necessarily reflect the official policy or position of ORPHEUS.

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