# The Attitudes of Medical Students toward the Importance of Understanding Classical Greek and Latin in the Development of an Anatomical and Medical Vocabulary

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Short title: Medical student's attitudes to Greek and Latin.

**Abstract:**

Students on entering medical school are faced with acquiring new, and voluminous, anatomical and medical terminologies. A reason why acquiring these terminologies may be problematic relates to the fact that many terms are derived from classical Greek and Latin; languages nowadays that are rarely taught at school. It might also be supposed that the often reported reduction in exposure to anatomy, and time spent in the dissection room, impairs the students' knowledge and understanding of anatomical relationships, and thus further complicates the acquisition of the terminologies. To date, there have been no studies that have quantified the attitudes of medical students towards the importance of understanding classical Greek and Latin during their medical training. In order to assess these attitudes, this study was undertaken for the newly-recruited (First Year) medical students and for the Final Year medical students at Cardiff University. They were provided with a brief questionnaire that was devised in accordance with Thurstone and Chave (1951) principles and with ethical approval. One hundred and eighty First Year students and one hundred and nineteen Final Year students responded. Our initial hypothesis was that students throughout the medical curriculum have an unfavourable attitude towards the importance of classical Greek and Latin. This hypothesis was supported by the attitudes of the Final Year students but not by the First Year medical students. While we would still advocate that First Year medical students should acquire some understanding of and have some formal or informal instruction in, classical Greek and Latin as they pertain to medical terminologies, we acknowledge that Final Year students are likely to have become reasonably well-versed in the origins of medical terminologies without formal instruction.

**Introduction:**

Anatomy has long been the cornerstone for medical curricula, providing fundamental information, skills and attitudes for all medical specialities (Turney *et al*., 2001; Patel and Moxham, 2006; Turney, 2007; Sugand *et al.,* 2010; Papa and Vaccarezza, 2013). However, in recent times anatomy has been described as being 'banausic', 'archaic', 'didactic', 'traditional', 'overtly factual' and 'unable to adapt to modern educational methods' (Turney, 2007). Indeed, the General Medical Council in the United Kingdom issued guidelines in 1993 stating that the weight of factual information in all basic sciences within the medical curriculum should be reduced. This has resulted in reduced teaching hours for anatomy in the medical curriculum in the United Kingdom and the students have fewer opportunities to dissect. As for the United Kingdom, following recommendations from the American Association of Medical Colleges (AAMC), the teaching hours devoted towards anatomy has been considerably reduced in the United States of America (Drake, 1998; Drake *et al.,* 2009; Drake *et al.,* 2002). The loss of anatomy's proportional weighting in medical curricula has also impacted significantly on the number of qualified anatomy teachers (Turney *et al.*, 2001; Lockwood and Roberts, 2007). As a consequence, it can be proposed that these changes can lead to reduced understanding of the anatomical terminologies amongst the students that affects their ability to learn and retain newly introduced terminologies (Kulkarni, 2014; Singh *et al*., 2015).

We suggest that medical students find new anatomical terminologies challenging to learn since they are derived from classical Greek and Latin. The students who enrol

into medical school nowadays appear to have little, or no, prior knowledge of these languages. In recent years, the importance of learning classical languages has declined in schools across the United Kingdom. According to the *Cambridge School Classics Project* (2008), out of 4,725 secondary schools within the United Kingdom (3,972 state-funded and 753 independent schools), only 20% of the state-funded schools teach Latin and Greek compared to 60% of the independent schools. It has been extrapolated from these data that only 5-7% of the school population have access to the learning of classical languages in the United Kingdom. It is possible that the reason for the decline of classical Greek and Latin in schools relates to the perception that the job market has changed such that humanities are not so well appreciated as in the past. Indeed, many of the highly paid jobs such as computing, banking and business do not require the knowledge or understanding of classical languages and therefore many schools have stopped offering these languages in their curricula.

To understand and learn complex anatomical terminologies, students must devise appropriate learning styles and approaches, although these are likely to vary from student to student. For example, anatomical terminologies are sometimes learnt with the help of mnemonics. This method of learning is essentially a ‘superficial approach’ as it is based on the utilitarian recalling of the facts. Mirghani *et al*. (2014) reported that medical students in the preclinical years use this superficial learning approach to act as scaffolding for the deep learning (applying knowledge) later in the clinical years. However, in a recent survey of medical students at Cardiff University and at the University of Sorbonne, Morgan *et al*. (2014) reported that the students knew very few mnemonics (on average 1-8 mnemonics). Furthermore, 26% of the students had no

knowledge of mnemonics, 30-34% knew just one mnemonics and only 1-2% claimed to know more than 10. It has been suggested that First Year medical students prefer using all available learning styles while learning anatomy, including visual, auditory and kinaesthetic techniques (VAK) (Heidi *et al*., 2006). This can be achieved by dissection and small group teaching. With reduced amount of time spent dissecting, the learning styles and approaches to acquiring anatomy will change to reflect evolving technological advances. Nevertheless, regardless of the technologies used, medical students will be confronted with anatomical terminologies that will require them to increase their vocabularies in a very significant way. Thus, in order to understand how students react to the task of learning anatomy it is important to understand the perception (attitude) of medical students to the importance of classical languages such as Greek and Latin within the medical curriculum. To date, there has been no study into the attitudes of medical students to classical Greek and Latin in studying and practising medicine. Our aim in this investigation was to assess the attitudes of medical students at Cardiff University in the First and Final Years. This was accomplished using a Thurstone and Chave questionnaire and the hypothesis that we tested was that the medical students do not appreciate the relevance of classical Greek and Latin in the learning and practice of anatomy and medicine.

**Methods:**

The questionnaire was designed according to the tenets for analysing attitudes devised by Thurstone and Chave (1951) and consisted of a series of 20 randomly arranged statements that covered a variety of attitudes towards classical Greek and Latin and the importance of understanding these languages for medical education

(Table 1). Prior to distributing questionnaires to the medical students, a group of 25 independent persons were employed to act as 'judges' in order to provide numerical scores for each of the statements in the questionnaire. These judges were basic scientists from the Cardiff School of Biosciences and surgical trainees, who did not participate further in the study. The 'judges' were given full instructions that enabled them to complete their task. The 'judges' assigned a score between 1 and 11 for each of the statements (e.g. 1 being extremely favourable, 11 being extremely unfavourable, 6 being moderate). The median of the 'judges' scores provided a quantitative evaluation for each statement and established that the statements in the questionnaire covered the whole range along the attitude continuum from 1 to 11. This method of quantitatively assessing attitudes is described as the ''Equal Appearing Interval Scale'' (Thurstone and Chave, 1951; Lemon, 1973; Rajecki, 1990).

Following ethical approval from the Research Ethics Committee of the Cardiff School of Biosciences, the questionnaires were distributed amongst the First and Final Year medical students. The students were given a consent form along with the questionnaire and their participation was voluntary. The questionnaires for the First Year students were distributed in hard copy and completed at the end of a timetabled class under the supervision of the principal investigator. For the Final Year students, the questionnaires were made available using the ''Survey Monkey'' online tool. Both the First and the Final Year cohorts of students had opportunities to ask questions to the principal investigator prior to the completion of the questionnaire. For completion of the questionnaire, the students were asked to tick only those statements with which they were in full agreement. Once the questionnaires were completed, the statements that the student selected were evaluated using the 'judges' scores and thus a mean

attitude score for each and every student participating in the survey could be calculated. The data were analysed using Excel spreadsheets, Minitab 17 statistical software, Anderson-Darling normality test, General Linear Model, Whitney-Mann U test and t-tests.

**Results:**

A total of 180 First Year medical students (60% of the cohort) and 119 Final Year medical students (40% of the cohort) completed the questionnaires.

Figure 1 provides a histogram showing the attitudes of First and Final Year medical students to the clinical relevance of classical Greek and Latin. According to the 'attitude scale values' defined by Thurstone and Chave (1951), scores less than 7 are considered to be favourable to the view that classical Greek and Latin are important for the learning and practice of anatomy and medicine. Using Anderson-Darlington Normality tests, statistical analyses showed that all sets of data were not normally distributed (Figures 2 and 3). These findings were substantiated using a General Linear Model test and we concluded that the scores were closely related within each year. Furthermore, this test and Whitney Mann tests (together with a t-test given that $n>100$) showed that there was a highly significant statistical difference between the First Year and Final Year data ($p<0.00001$).

**Discussion:**

Visser *et al*. (1996) have reported that a response rate for a survey of between 60% and 100% should be considered as being high and that a response rate of between 40% and 59% should be regarded as being moderate. Furthermore, both high and moderate response rates are acceptable for producing reliable data in order to interpret and evaluate hypotheses. For the present survey, there was a high response rate from the First Year medical students and a moderate response rate from the Final Year students. As a further issue relating to the design of the survey, it is undoubtedly the case that longitudinal studies are to be preferred. While the present study is only 'pseudo-longitudinal', we have no reason to suggest that the two cohorts of medical students surveyed have had different experiences and educational exposure within the same curriculum. In addition, the admission procedures were identical for both cohorts.

The results show that only a small proportion of the medical students enrolling at Cardiff University have prior knowledge of Greek and Latin (11%). Nevertheless, most of the First Year students held very positive attitudes towards these languages in terms of their usefulness for learning anatomy and medicine (the range of attitude scores was between '1' and '5' with a mode value of '3'). On the other hand, the mode value for the Final Year medical students was '9', a value that indicates that these students close to finishing their medical education do not believe that Greek and Latin were important for the learning and practice of medicine. Since our initial hypothesis was that medical students have an unfavourable attitude towards the importance of Greek and Latin, we were surprised that the hypothesis only held for the Final Year students.

We offer here three explanations as to why the Final Year students might have a different attitude towards the importance of the classical languages to medical education.

First, since anatomy is suffused with terms derived from classical Greek and Latin it might be that, as the students progressed through their courses, they had a diminished respect or attitude towards the importance of anatomy. However, in previous studies on attitudes of medical students towards gross anatomy and the perception of medical students towards the clinical relevance of anatomy (Moxham and Plaisant, 2007; Plaisant *et al.,* 2014), it was established that First and the Final Year medical students do not differ in terms of having very positive attitudes towards anatomy.

Second, it might be thought that our findings relate to the ways in which anatomy is taught within the medical curriculum at Cardiff University. Presently, except for head and neck anatomy which is taught on prosections as 'station-based teaching', the anatomy course is practically-based, consisting of 11 weeks of intense and active dissection with cadavers and without any formal lectures or tutorials in anatomy. Furthermore, there are no formal lectures or tutorials on classical languages or on the issues relating to terminologies at any stage during the medical curriculum. There is also no structured teaching of gross anatomy in the medical curriculum after the initial (and early) experience of the subject. It is possible, therefore, that the negative attitudes stem from the lack of 'propaganda' at the start of the course (and possibly at other stages in the curriculum) concerning medical terminologies, the etymological

roots in the classical languages, and the value of appreciating the ‘meanings’ behind the terms that shed light on their understanding (e.g. anatomical terms that explain the functions, or derivations, or destinations, or shape or locations of structures).

Third, “familiarity breeds contempt” and it is frequently said anecdotally that persons who have become competent at tasks or knowledge often become bored with topics or assume that they have always had the competence and never had to acquire the skills and knowledge. This lack of appreciation, or ennui, towards the classical languages might arise over a period of time as they develop the skills to interpret different medical terminologies through their exposure in clinical practice. Consequently, because the students get accustomed to different terminologies they are able to relate to new medical terminologies because of a prior knowledge which they have now assumed as being so fundamental as not to require forethought. To tease out the reasons for the change in attitude, further studies will be necessary that probably involved qualitative assessment through structured interviews.

The results of the survey support the view that medical students during the initial years of medical curriculum would appreciate acquiring some understanding of, or having some instruction in, classical Greek and Latin as they pertain to medical terminologies. In the absence of formal lessons, students should at the very least be made aware of the availability of books and dictionaries that can help their learning (for example, Lewis 1990; Dennerll 2002; Lisowski and Oxnard 2007; Marcovitch 2009; Martin 2015). It could be argued however that, because the Final Year students in this survey

(who had no instruction in terminologies) did not have positive attitudes towards the importance of classical languages, no formal instruction is required. Nevertheless, it is possible that their attitudes could have been more positive if they have had formal instruction and indeed their understanding of the terminologies could have consequently been enhanced.

Finally, the international body responsible for defining anatomical terminologies is the International Federation of Associations of Anatomy (IFAA). Under its auspices, a Federative International Programme for Anatomical Terminologies (FIPAT) has to date published three volumes defining anatomical terms (*Terminologia Anatomica*, 1998, *Terminologia Histologica*, 2008 and *Terminologia Embryologica*, 2013) These terminologies, while recognising that contemporary languages such as English are in common use in anatomy and medicine, insist that international terminologies must remain using the classical Greek and Latin derivations. Thus, the importance of classical languages to modern medicine is affirmed and consequently medical students should be made aware of elements of these languages as they pertain to the understanding of medical terms.

**References:**


Drake RL, Lowrie DJ, Prewitt CM. 2002. Survey of gross anatomy, microscopic anatomy, neuroscience, and embryology courses in medical school curricula in the United States. *Anat Rec* **269**:118–122

Drake RL, McBride JM, Lachman N, Wojciech P. 2009. Medical Education in the Anatomical Sciences: The Winds of Change Continue to Blow. *Anat Sci Educ* **2**:253–259

Drake RL. 1998. Anatomy education in a changing medical curriculum. *Anat Rec* **1**:28–31.

Federative Committee on Anatomical Terminology (1998). *Terminologica Anatomica*: International Anatomical Terminology. New York: Thieme Stuttgart.

Federative International Committee on Anatomical Terminology (2008). *Terminologia Histologica*: International terms for Human Cytology and Histology. United States: Lippincott Williams and Wilkins

Federative International Programme on Anatomical Terminologies (2013). *Terminologia Embryologica*: International Embryological Terminology. New York: Thieme Stuttgart.

General Medical Council. 1993. Tomorrow's doctors. Recommendations on undergraduate medical education. London: General Medical Council Publications

Heidi L, Lujan, Stephen E. DiCarlo. 2006. First-year medical students prefer multiple learning styles. *Advances in Physiology Education* **30(1)**: 13-16

http://www.cambridgescp.com/downloads/Latin_in_UK_secondary_schools_2008.pdf.

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1964553/

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC38

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3841482/

Kulkarni JP. 2014 Importance of cadaver dissection—a brief review report. *SMU Med J* **1(2)**:128–131

Lemon N. 1973. Attitudes and their measurements. New York: Wiley

Lockwood AM, Roberts AM. 2007. The anatomy demonstrator of the future: an examination of the role of the medically-qualified anatomy demonstrator in the context of tomorrow's doctors and modernizing medical careers. *Clin Anat* **20**:455–459

Mirghani HM, Ezimokhai M, Shaban S, van Berkel HJ. 2014. Superficial and deep learning approaches among medical students in an interdisciplinary integrated curriculum. *Educ Health* **27(1):**10-4

Moxham BJ and Plaisant O. 2007. Perception of medical students towards the clinical relevance of anatomy. *Clin. Anat* **20**:560–564

Papa V and Vaccarezza M. 2013. Teaching Anatomy in the XXI Century: New Aspects and Pitfalls. *Scientific World Journal*. **2013**: 310348

Patel KM, Moxham BJ. 2006. Attitudes of professional anatomists to curricular change. *Clin Anat* **19**:132–141

Rajecki D. 1990. Attitudes. Sunderland, Massachusetts: Freeman, WH

Singh R, Tubbs S Tubbs, Gupta K, Singh MD, Jones G and Kumar R. 2015 Teaching anatomy- is the decline of human anatomy hazardous to medical education/profession?—a review. *Surgical and Radiologic Anatomy* **37**:1257-1265

Sugand K, Abrahams P, Khurana A. 2010. The anatomy of anatomy: a review for its modernization. *Anat Sci Educ* **3(2):**83-93.

Thurstone LL, Chave EJ. 1951. The measurement of attitude: A psychophysical method and some experiments with a scale for measuring attitude towards the church. Chicago, IL: University of Chicago Press.

Turney BW, Gill J, Morris JF. 2001. Surgical trainees as anatomy demonstrators: revisited. *Ann R Coll Surg Engl* **83 (1):**193–5.

Turney BW, Gill J, Morris JF. 2001. Surgical trainees as anatomy demonstrators: revisited. *Ann R Coll Surg Engl (Suppl)* **83**:193–195

Turney BW. 2007. Anatomy in a Modern Medical Curriculum. *Ann R Coll Surg Engl* **89(2):** 104–107.

Visser, Penny S., Jon A, Krosnick, Marquette J, and Curtin M. 1996. “Mail Surveys for Election Forecasting? An Evaluation of the Colombia Dispatch Poll.” *Public Opinion Quarterly* **60**: 181–227.

Plaisant O, Stephens S, Apaydin N, Courtois R, Lignier B, Loukas M and Moxham B. 2014. Medical students' attitudes towards science and gross anatomy, and the relationship to personality. *Journal of Anatomy* **224(3):** 261-269

An anatomical workbook (1990). Lewis S. Butterworth-Heineman Ltd. London

Black's medical dictionary (2009). Marcovitch H. A&C Black Business Information and Development. Oxford

Concise colour medical dictionary (2015). Martin E. Oxford University Press. Oxford

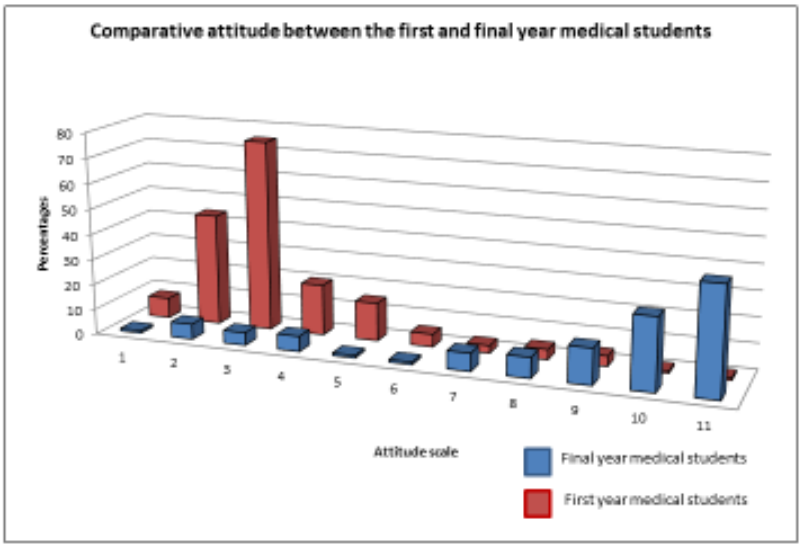
Morgan S, Plaisant O, Lignier B and Moxham BJ. 2014. Sexism and anatomy, as discerned in textbooks and as perceived by medical students at Cardiff University and University of Paris Descartes. *Journal of Anatomy* **224(3):** 352-365

**Table:1.** Statements in the questionnaire used to assess the attitudes of medical students toward the importance of understanding classical Greek and Latin in the development of an anatomical and medical vocabulary according to the method devised by Thurstone and Chave (1951). In answering the questionnaire, a respondent is required only to indicate which statements he/she is in complete agreement with.

| | | |
|---|---|---|
| 1 | Greek and Latin terminology develops the vocabulary for Medicine. | 4 |
| 2 | The knowledge of Greek and Latin terminology is useful only during the preliminary years of Medicine and not when the doctor is experienced. | 7 |
| 3 | Better the knowledge of Greek and Latin terminology better is the doctor at diagnosing the disease. | 2 |
| 4 | The knowledge of Greek and Latin terminology is a ''necessary evil'' in Medicine. | 6 |
| 5 | The knowledge of Greek and Latin terminology is of some use in clinic, but its importance may be exaggerated. | 8 |
| 6 | The knowledge of Greek and Latin terminology is of some importance since it displays that doctors are learned. | 5 |
| 7 | Greek and Latin terminology are old fashioned and that it has no importance in contemporary medicine. | 10 |
| 8 | The knowledge of Greek and Latin terminology is not required by the doctor as the treatment consists of understanding the aetiology of the disease and not terminology. | 8 |
| 9 | The knowledge of Greek and Latin terminology is required only to understand basic sciences such as Anatomy. | 7 |
| 10 | Every doctor must have knowledge of Greek and Latin. | 2 |
| 11 | If alternative and Eastern Medicine can do without the knowledge of Greek and Latin, so can Western Medicine. | 11 |

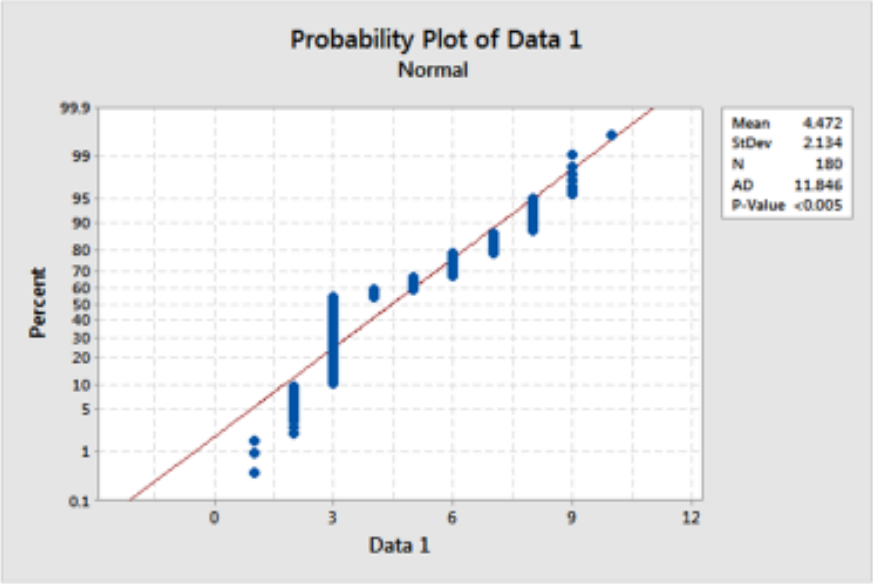
| | | |
|---|---|---|
| 12 | It is impossible to conceive of good medical training without a major Greek and Latin component. | 3 |
| 13 | Not all specialities in Medicine require the knowledge of Greek and Latin terminology. | 7 |
| 14 | Medicine cannot exist without the knowledge of Greek and Latin terminology. | 1 |
| 15 | The knowledge of Greek and Latin terminology improves the ability to write medical prescription by doctors. | 3 |
| 16 | Greek and Latin are redundant since it is replaced by contemporary English terminologies. | 9 |
| 17 | Only a limited knowledge of Greek and Latin terminology is required for satisfactory medical practice. | 7 |
| 18 | Many doctors from the East do well in treating the patients without any basic knowledge of Greek and Latin terminology. | 10 |
| 19 | The knowledge of Greek and Latin terminology is not required to diagnose and treat a patient. | 9 |
| 20 | Without the knowledge of Greek and Latin terminology, the doctor is of limited effectiveness. | 3 |

Note that the above “attitude scale” deemed appropriate by the “judges” are included here in the final column but were not provided in the questionnaire distributed to potential respondents.



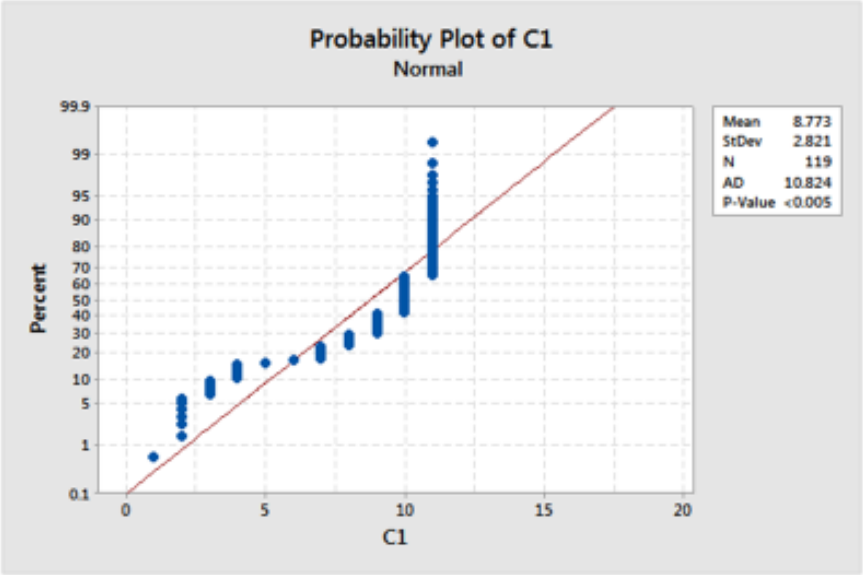

Attitude scale comparing the first and final year medical students

Figure 1: Histogram showing the attitudes of responding of First and Final Year medical students towards the relevance of classical Greek and Latin in medicine. A low score indicates the attitude that classical languages have high relevance to medicine, while a high score indicates that the classical languages are perceived as having low relevance.




Anderson-Darling normality test for first year medical students

Figure 2: Graph showing the Anderson-Darlington normality test for first year medical students at Cardiff. The graph shows that all sets of data were not normally distributed.




Anderson-Darling normality test for final year medical students

Figure 3: Graph showing the Anderson-Darlington normality test for final year medical students at Cardiff. The graph shows that all sets of data were not normally distributed.