

# Perception and Motivation of First-Year Medical Students Regarding the Teaching of Physiology at Alioune Diop University of Bambey: An Exploratory Analysis

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## Abstract

**Background:** Physiology is a fundamental and complex discipline in medical education, the mastery of which underpins understanding of clinical sciences. In the African context, characterized by limited teaching resources and growing student cohorts, assessing student perceptions is an essential lever for improving teaching quality.

**Objective:** This study aims to explore the perceptions and motivations of first-year medical students (Year 1) regarding the teaching of physiology at Alioune Diop University of Bambey (UADB), Senegal.

**Methods:** A descriptive cross-sectional survey was conducted among 39 Year 1 students using a structured anonymous questionnaire using Likert-scale including items. Themes covered pedagogical content, tutorial sessions (TD), teacher-student interaction, material conditions, and student motivation.

**Results:** Students were predominantly female (69.2%), with a mean age of 20.2 years, mostly single (97.4%), and of Senegalese nationality (82.1%). They rated the pedagogical content positively (69-76% agreement on key items) and the teacher-student interaction favourably (87-92% for communication-related items). Tutorial sessions were highly valued, with 76.9% agreement on their contribution to understanding. In contrast, material conditions received mixed to negative

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ratings: only 38.9% found classrooms suitable. Intrinsic motivation remained high: 89.5% believed that every physiology class can be interesting if one works hard, and 89.7% found the course genuinely interesting.

**Conclusion.** Despite significant infrastructural constraints 1<sup>st</sup> year students, they expressed an overall positive perception of physiology teaching and sustained intrinsic motivation. Targeted investment in teaching equipment and the strengthening of tutorial sessions could substantially improve learning outcomes.

**Keywords:** Medical education; physiology; student perception; motivation; tutorial sessions; sub-Saharan Africa; UADB

## Introduction

Physiology lies at the heart of basic medical education. It serves as the conceptual bridge between the basic sciences - anatomy, biochemistry, and biophysics - and clinical disciplines. Its mastery conditions the understanding of physiopathological mechanisms and, ultimately, the clinical reasoning of the future physician<sup>(1,2)</sup>. In sub-Saharan African countries, the teaching of physiology faces significant structural challenges: overcrowded cohorts, insufficient practical laboratory equipment, limited availability of appropriate bibliographic resources, and heterogeneity in students' prior preparation<sup>(3)</sup>.

Alioune Diop University of Bambey (UADB), founded in 2007, has in recent years established a Department of Medicine training students in the first and second years of the medical curriculum (Year 1 and Year 2, corresponding to the French Licence 1 and Licence 2). Physiology is taught through lectures, directed tutorial sessions (TD), and in some cases practical sessions (TP). This context of a young university with developing resources makes the evaluation of student perceptions particularly pertinent.

The international literature underlines that student perceptions of teaching quality constitute an important determinant of academic engagement and success<sup>(4,5)</sup>. Moreover, intrinsic motivation, defined as the spontaneous interest in a discipline and the pleasure of learning, is a robust predictor of long-term performance, superior to extrinsic motivation driven solely by assessment requirements<sup>(6,7)</sup>.

To our knowledge, no study has yet systematically documented the perceptions and motivations of first-year medical students regarding the teaching of physiology at UADB or any other Senegalese

university. This exploratory study therefore aims to fill the gap by analysing responses of 1<sup>st</sup> year students across five dimensions: pedagogical content, the role of tutorial sessions, teacher-student interaction, material conditions, and student motivation.

## Material and Methods

### Study Type and Setting

This was a descriptive cross-sectional study with an exploratory aim, conducted within the Department of Medicine of the Faculty of Health Sciences (UFR Santé et Développement Durable) at UADB, Bambey, Senegal. The survey was administered at the end of the first semester of the physiology course, during the 2024-2025 academic year.

### Population and Sample

The target population comprised all students enrolled in the first year of the medical curriculum (Year 1) at UADB. A total of 39 students participated, representing an exhaustive, census-based sample of the cohort. All enrolled students completed the questionnaire in full; there were no refusals or incomplete submissions, yielding a response rate of 100%. Participation was voluntary and anonymous.

### Data Collection Instrument

Data were collected using an anonymous self-administered online questionnaire hosted on KoboToolbox. The questionnaire comprised: (i) a socio-demographic section (gender, age, marital status, nationality); (ii) five thematic sections assessing respectively pedagogical content, tutorial and practical sessions, pedagogical interaction,

material conditions and the learning environment, and motivation and learning strategies; and (iii) a section on overall perceptions of the course. Attitude and perception items used a five-level Likert scale (Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree).

The questionnaire was developed using a structured content validation process. Items were adapted from validated instruments in medical education research, specifically the Course Experience Questionnaire (CEQ) and the Motivated Strategies for Learning Questionnaire (MSLQ). Following a French translation, item relevance was reviewed and confirmed by an expert panel consisting of two physiologists and one medical education specialist. Furthermore, this instrument was previously employed in a similar study among medical students in Saint-Louis (Senegal)<sup>(8)</sup>, ensuring its cultural and contextual suitability for our study population.

### Data Analysis

Data were exported in Excel format and analysed using the Python programming language (Pandas

library). Likert-scale responses were recoded into three categories: 'In agreement' (combining Strongly Agree and Agree), 'Neutral', and 'In disagreement' (combining Disagree and Strongly Disagree). Results are expressed as absolute and relative frequencies (percentages). Graphical representations were generated using the Matplotlib library.

### Ethical Considerations

This study was conducted in accordance with the principles of the Declaration of Helsinki. Informed verbal consent was obtained from all participants before the questionnaire was administered. Students were informed that their participation was entirely voluntary, that their responses would be anonymized, and that non-participation would have no academic consequences. No personally identifiable information was collected.

### Results

#### Demographic Profile of the 1<sup>st</sup> year students

The 1<sup>st</sup> year sample comprised 39 students. Table I presents the distribution of sociodemographic characteristics of this group

**Table I. Sociodemographic characteristics of 1<sup>st</sup>Year students (n = 39)**

Variable	Category	n	%
Gender	Female	27	69.2%
	Male	12	30.8%
Age (years)	19	6	15.4%
	20	23	59.0%
	21	6	15.4%
	22	3	7.7%
	23	1	2.6%
Marital status	Single	38	97.4%
	Married	1	2.6%
Nationality	Senegalese	32	82.1%
	Mauritanian	4	10.3%
	Comorian	2	5.1%
	Togolese	1	2.6%
<b>TOTAL</b>	<b>Year 1</b>	<b>39</b>	<b>100%</b>

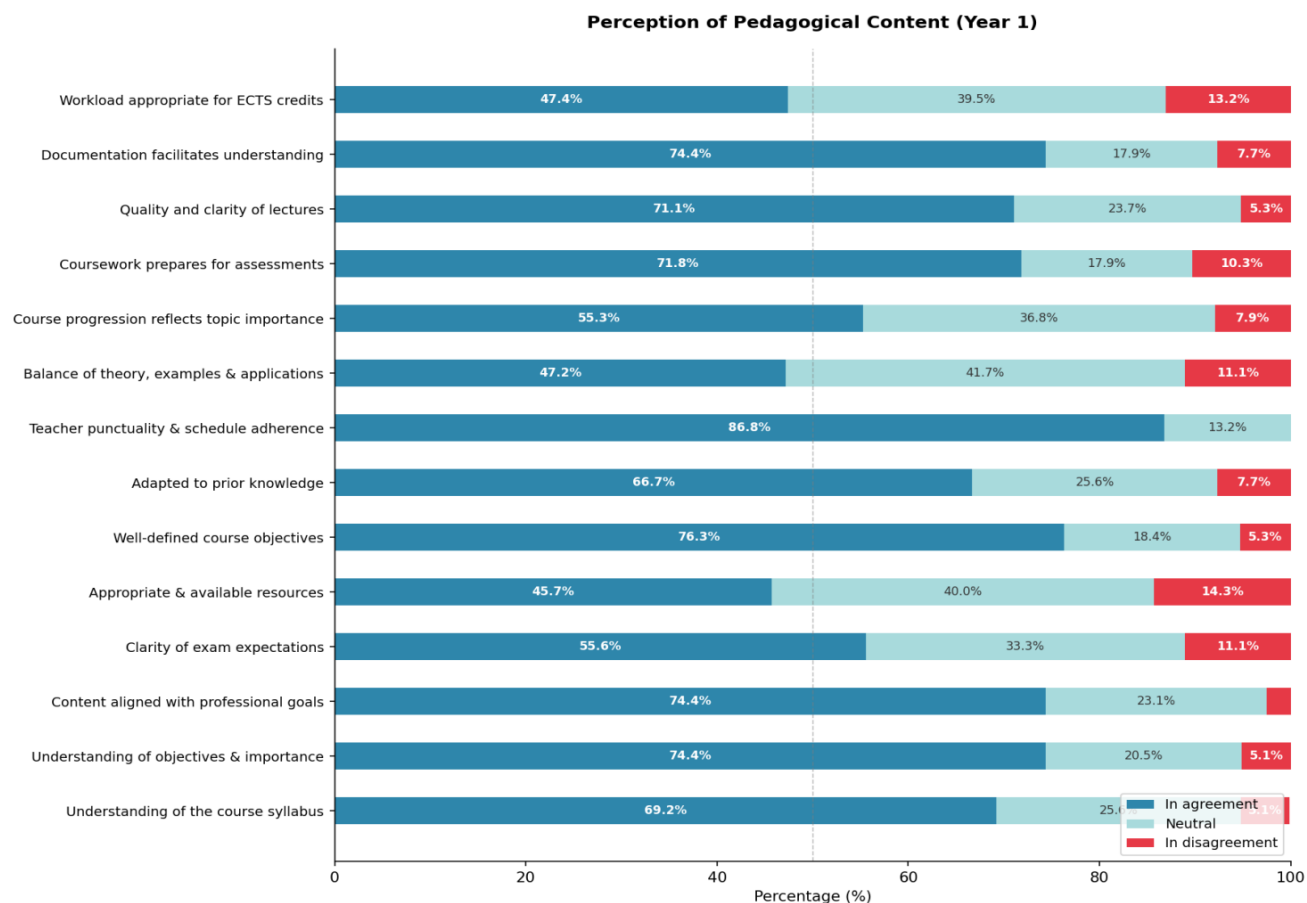
The cohort was predominantly female (69.2%), with a male-to-female ratio of 0.44. The mean age was  $20.2 \pm 0.9$  years (median: 20 years; range: 19–23 years). Almost all students were single (97.4%). Regarding nationality, 82.1% were Senegalese, with the remainder coming from Mauritania (10.3%), the Comoros (5.1%), and Togo (2.6%), reflecting the university's sub-regional reach.

Regarding their global perception of the discipline, 69.2% of 1<sup>st</sup> Year students considered physiology a 'difficult' subject, while 30.8% rated it as 'moderate'. Global perceptions were assessed through four closed-ended questions included in the same anonymous questionnaire administered

to all students. Despite this perceived difficulty, 92.3% stated that they appreciated the teaching (Yes: 92.3%; No: 2.6%; Not sure: 2.6%). Similarly, 82.1% considered that attending lectures was necessary to understand physiology, and 82.1% felt the subject had provided them with useful knowledge and competencies for their medical training.

### Perception of Pedagogical Content

Figure 1 presents the distribution of 1<sup>st</sup> year students' responses regarding items related to the pedagogical content of the physiology course.



**Figure 1. Perception of pedagogical content by Year 1 students (n = 39)**

Teacher punctuality and adherence to the schedule received the highest agreement rate (86.8%), reflecting an appreciation of the organizational

quality of the course. Course objectives were considered well-defined by 76.3% of respondents. Understanding of the syllabus and course objectives

was affirmed by 69.2% and 74.4% respectively. The quality and clarity of lectures were judged satisfactory by 71.1% of students, and supporting documentation was considered facilitative by 74.4%.

However, two items received agreement rates below 50%: the availability of necessary resources (45.7% in agreement, 14.3% in disagreement) and the adequacy of the workload relative to the ECTS credit allocation (47.4% in agreement, 13.2%

in disagreement). The balance between theory, examples, and practical applications was also perceived as insufficient by only 47.2% of students.

### Role of Tutorial Sessions - Impact on Learning

Table II summarizes data relating to the impact of tutorial sessions (TD) and practical sessions (TP) on 1<sup>st</sup> Year student learning.

**Table II. Impact of tutorial and practical sessions on learning (Year 1, n = 39)**

Statement	In agreement (%)	Neutral (%)	In disagreement (%)
Tutorials (TD) improve understanding of the physiology course	76.9%	18.0%	5.1%
Practical sessions (TP) consolidate concepts covered in lectures	60.5%	36.9%	2.6%
More motivated during TP/TD than during lectures	65.8%	23.7%	10.5%
Coursework (lectures, TD, TP) adequately prepares for assessments	71.8%	17.9%	10.3%

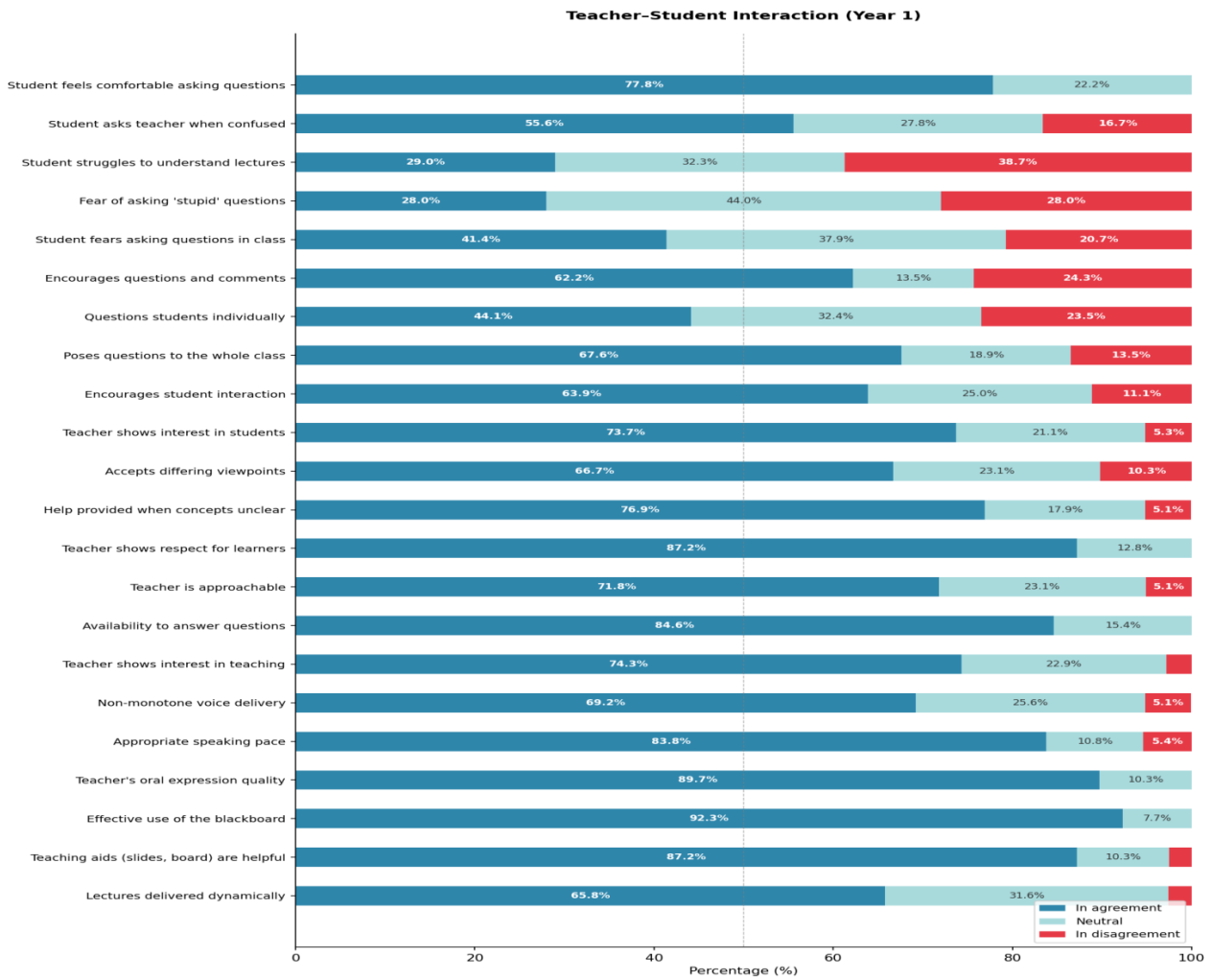
The results show that tutorial sessions were perceived as a particularly effective learning tool: 76.9% of students considered that they improved their understanding of the physiology course. Practical sessions were also valued, albeit to a lesser extent (60.5% in agreement). Notably, 65.8% of students reported feeling more motivated during practical and tutorial sessions than during lectures, underscoring the added value of interactive and applied formats over frontal teaching.

Regarding preparation for assessments, 71.8% of students reported that the coursework (lectures, tutorials, and practicals) adequately prepared them, while 10.3% expressed disagreement. Data collected on tutorial sessions showed a high level of student

endorsement regarding their role in the curriculum. For practical sessions, the proportion of unfavorable opinions was 2.6%, with 36.8% of respondents maintaining a neutral position. The results indicate that the perception of human teaching quality remained positive, despite recorded observations concerning material resources and available equipment.

### Teacher-Student Interaction: Pedagogical Engagement

Figure 2 illustrates the distribution of 1<sup>st</sup> year students' responses concerning the quality of pedagogical interaction with their teacher.



**Figure 2: Teacher-student interaction as perceived by Year 1 students (n = 39)**

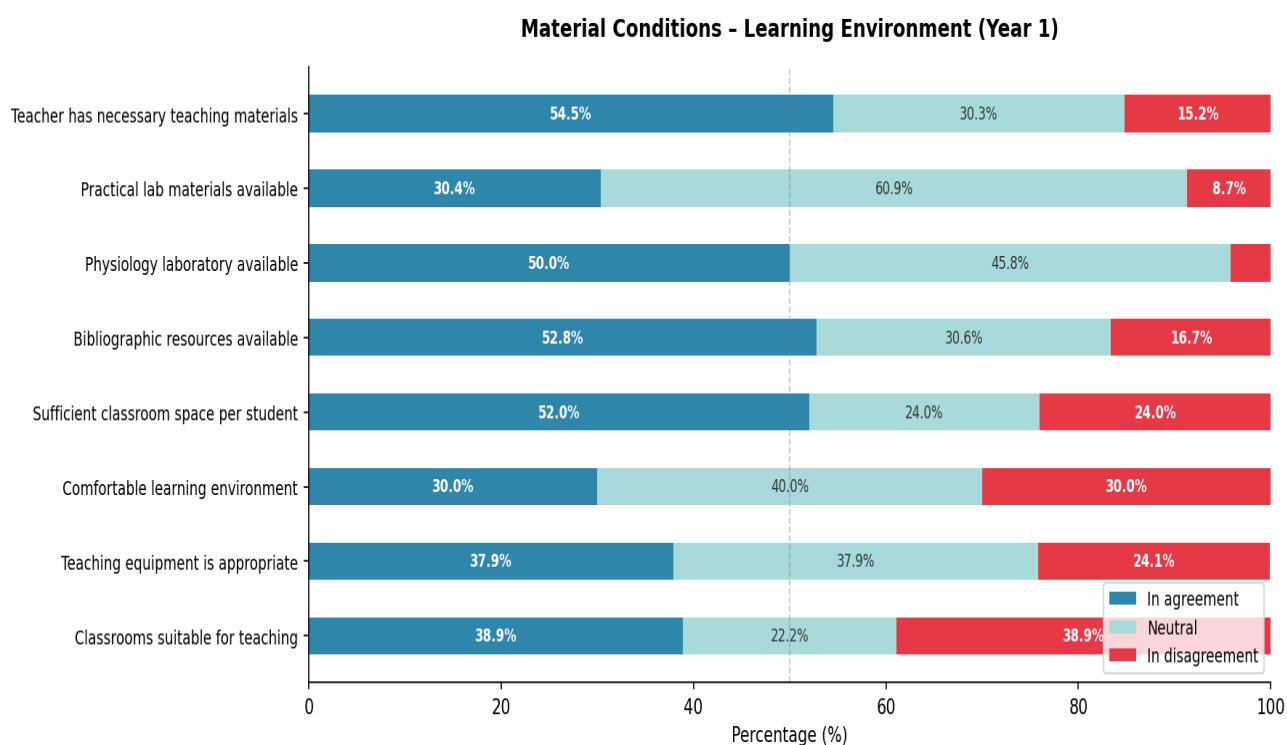
Pedagogical interaction was overall very positively evaluated by Year 1 students. The highest-rated dimensions concerned the teacher’s communication: use of the blackboard (92.3% in agreement), oral expression quality (89.7%), availability to answer questions (84.6%), and respect shown to learners (87.2%).

Dimensions related to active interaction showed slightly lower rates: encouraging student interaction (63.9% in agreement, 11.1% in disagreement), individual questioning of students (44.1% in agreement, 23.5% in disagreement), and encouraging questions and comments (62.2% in agreement, 24.3% in disagreement).

From the student’s point of view, positive indicators emerged where 77.8% felt comfortable asking questions to the teacher, and 55.6% reported systematically consulting the teacher when they encountered comprehension difficulties. However, 41.4% of students admitted fearing to ask questions during class, and 28.0% were apprehensive about being reproached for asking ‘stupid’ questions.

### Material Conditions and Learning Environment

Figure 3 presents Year 1 students’ perceptions of material teaching conditions.



**Figure 3: Material conditions and learning environment as perceived by 1<sup>st</sup> year students (n = 39)**

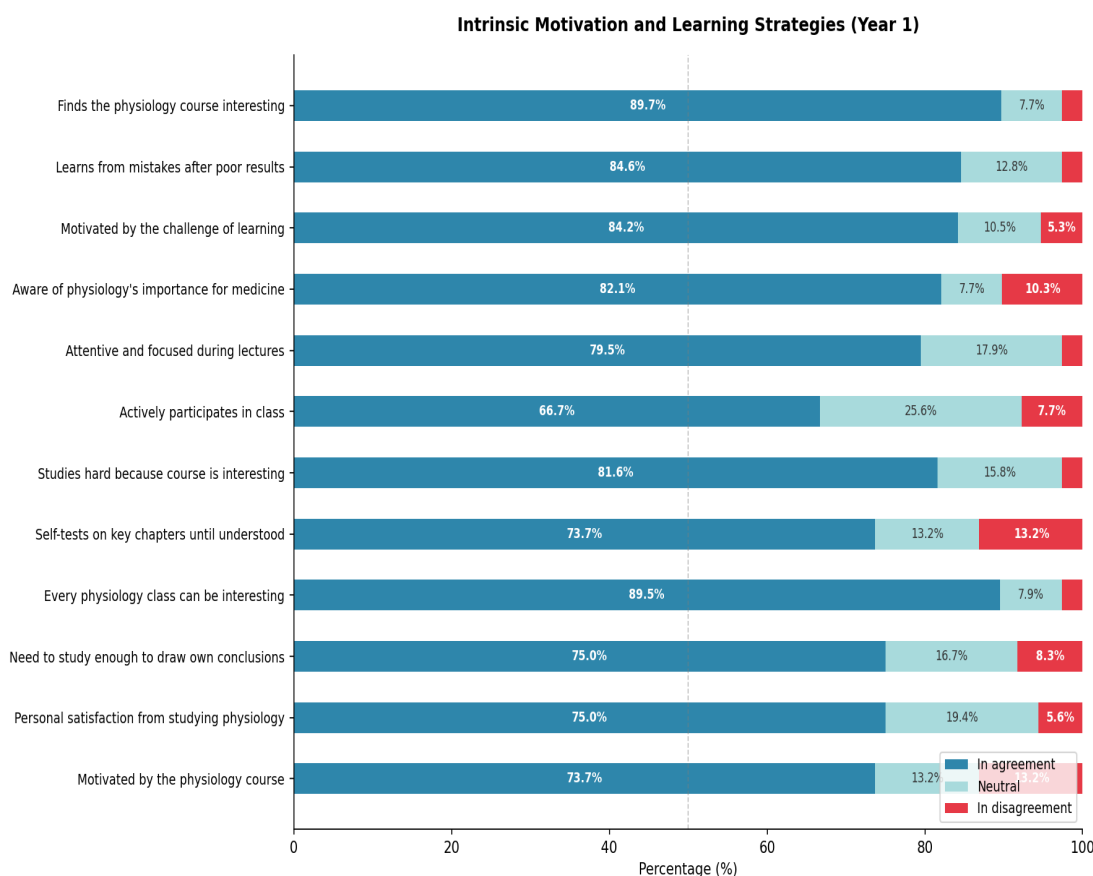
Material conditions were the most clearly identified weakness in this study. Agreement rates were particularly low for several critical items. The suitability of classrooms for teaching was endorsed by only 38.9% of students, with an equal rate of disagreement (38.9%). The adequacy of teaching equipment was validated by only 37.9% of respondents (24.1% in disagreement). The quality of the physical environment (air conditioning, ventilation, lighting) was deemed acceptable by only 30.0% of students, with an equal proportion in disagreement.

Practical session materials were perceived as available by only 30.4% of students, with 60.9% neutral responses, revealing widespread uncertainty about this resource. A physiology laboratory was reported as available by 50.0% of students, with 45.8% remaining neutral. In contrast, classroom space (52.0%) and bibliographic resources (52.8%) reached slightly above median satisfaction levels.

### Student Motivation and Learning Strategies

Figure 4 illustrates key items related to the intrinsic motivation of Year 1 students towards physiology.

The results reveal a high and remarkably consistent level of intrinsic motivation among Year 1 students. The highest agreement rates concerned the positive perception of the course (89.7% find the course interesting), engagement in learning despite difficulties (89.5% believe each class can be interesting if one works hard), and learning from mistakes after a poor result (84.6%). Awareness of the importance of physiology for future medical practice was affirmed by 82.1% of students, demonstrating a solid internalization of the discipline's instrumental value.



**Figure 4. Intrinsic motivation and learning strategies of Year 1 students (n = 39)**

Active learning strategies were also well represented: 83.8% worked in groups to prepare for tutorials and revise course material, 82.1% used additional sources when preparing for examinations, and 82.1% systematically endeavored to motivate themselves ahead of assessments. Active participation in class was declared by 66.7% of students.

Items with surface-learning or disengaged connotations revealed notable resistance. Only 34.6% believed that memorizing tutorial answers would suffice for examination success (65.4% in disagreement), and 44.8% thought that teachers should focus only on examination-relevant material. These results indicate that most students subscribe to a deep rather than surface approach to learning.

However, some tensions persist: 63.6% expressed a goal of passing with the least effort possible, and

48.3% believed that memorizing key chapters could be sufficient.

## Discussion

### First-year student profile and disciplinary positioning

This exploratory study constitutes, to our knowledge, the first systematic analysis of the perceptions and motivations of first-year medical students at UADB regarding the teaching of physiology. Our results are framed within the conceptual framework of self-determination theory<sup>(6)</sup> and the notion of perceived learning value.

The female predominance observed in our cohort (69.2%) is consistent with a trend documented across several West African medical schools, where women's access to higher health education has progressed significantly over the past decade<sup>(9)</sup>.

The mean age of 20.2 years is congruent with direct recruitment following the secondary school-leaving examination (baccalauréat), confirming the profile of a student in transition from secondary to higher education.

The broadly positive perception of the pedagogical content, despite the dominant perception of physiology as a difficult discipline (69.2%), suggests that the quality of teaching partially compensates for the intrinsic complexity of the subject. This result is consistent with the work of Biggs (1987)<sup>(10)</sup> on the stimulating pedagogical environment and its protective role against feelings of helplessness in the face of difficulty. This proportion is notably greater than what has been reported for anatomy at a comparable Senegalese institution. In a study conducted at the Faculty of Medicine of the Gaston Berger University of Saint-Louis (UFR 2S), reported that only 42.7% of 1st and 2nd year medical students considered anatomy a difficult subject<sup>(8)</sup> The gap of nearly 27 percentage points between the two disciplines, assessed with similar methodologies in the same national educational system, suggests that physiology carries a specific cognitive burden that may relate to its abstract, mechanistic character, as opposed to the more visual and spatial nature of anatomy. This finding reinforces the case for targeted pedagogical strategies adapted to the specific complexity of physiology, rather than generic approaches borrowed from other biomedical sciences.

### **The value of interactive teaching format**

The strong endorsement of tutorial sessions, with 76.9% of students reporting that TD improve understanding of physiology, and the declared preference for interactive over frontal teaching (65.8% more motivated during TD/TP than during lectures) confirm the evidence base on active learning in physiology<sup>(11,12)</sup> and are consistent with findings from Senegalese anatomy education. Well-designed tutorials have been shown to promote knowledge integration, development of reasoning skills, and preparation for assessments<sup>(13,14)</sup>. The relatively lower rating of practical sessions (60.5%

in agreement) is likely attributable to the material constraints identified elsewhere in the study. The strong endorsement of tutorial sessions in our study (76.9% of students reporting that TD improve understanding of physiology) and the declared preference for interactive over frontal teaching (65.8% more motivated during TD/TP than during lectures) are consistent with findings from Senegalese anatomy education. Manyacka Ma Nyemb et al. (2014) reported that 97.3% of medical students at the UFR 2S of Saint-Louis considered practical laboratory sessions essential, and 61.3% regarded them as more important than formal lectures<sup>(13)</sup>. The near-identical proportions found in our physiology study (65.8%) and in the anatomy study (61.3%) suggest that the preference for active, applied learning formats reflects a stable characteristic of Senegalese medical students' learning preferences, transcending disciplinary boundaries. The relatively lower rating of practical sessions in our study (60.5% in agreement) is likely attributable to the material constraints detailed in Section 4.4. Nonetheless, this convergence provides strong empirical grounding for curricular decisions to strengthen the proportion of interactive formats, TD, TP, and case-based discussions, in both anatomy and physiology across pre-clinical medical programmes in Senegal.

### **Teacher-student interaction, participatory inhibition, and the case for Problem-Based Learning**

The excellence of the perceived pedagogical relationship, teacher availability (84.6% agreement), respect (87.2%) and oral expression quality (89.7%), contrasts with the persistence of participatory inhibition among a significant proportion of students (41.4% fearing to ask questions during class). This phenomenon, well documented in African higher education contexts<sup>(15)</sup>, reflects asymmetric power dynamics in the teacher-learner relationship and the still-dominant transmissive pedagogical culture. It is not, however, an isolated finding specific to physiology at UADB. In a parallel study of anatomy teaching at the UFR 2S of Saint-Louis, found that 93.3% of students wished the final 30 minutes of each lecture to be reserved for open discussion<sup>(8)</sup>, a

desire that implicitly reflects the same unmet need for structured, legitimised interactive space. The persistence of inhibition despite a broadly supportive teacher-student relationship echoes what Manyacka has described as an institutionalised taboo around students' self-expression in the sub-Saharan African pedagogical culture<sup>(8,13)</sup>

To address this challenge, the experience of the Gaston Berger University of Saint-Louis in problem-based learning (PBL) offers a directly applicable model. Manyacka Ma Nyemb (2017) reported that 92% of medical students (n = 83) found the PBL approach stimulating and intuitive when introduced into the anatomy curriculum, with 81 out of 83 considering group discussions informative and learning objectives clear<sup>(14)</sup>. Crucially, the same five-point Likert scale used in our study was employed in that evaluation, allowing methodological comparability. The PBL model, which places students in small groups of 5-6 around clinical problems and requires them to reason, discuss and argue rather than passively receive information, has demonstrated efficacy precisely in contexts where frontal teaching induces inhibition. We therefore propose that the Department of Medicine at UADB consider the progressive introduction of PBL sessions into the physiology curriculum, using physiological and physiopathological clinical cases to contextualise abstract concepts. Applied to physiology, such sessions could bridge the gap between the mechanistic content of the discipline and its clinical relevance, an objective that 82.1% of our students already recognised as important for their medical training and would simultaneously reinforce intrinsic motivation and align with the deep learning orientation already evidenced in our cohort.

### **Material conditions: a systemic challenge across basic sciences in Senegal**

The major deficit identified in material conditions, particularly the inadequacy of classrooms (38.9% in agreement) and the shortage of practical session equipment (30.4%), represents a significant structural barrier to learning quality. These data align with the

findings of WHO reports on medical education in sub-Saharan Africa<sup>(3)</sup>, which highlight the chronic underinvestment in pedagogical infrastructure. These findings are not unique to physiology at UADB: Manyacka Ma Nyemb and Ndoye (2014), evaluating anatomy teaching at the UFR 2S of the Gaston Berger University of Saint-Louis, reported that practical laboratory sessions received the lowest satisfaction score of all teaching modalities (mean 2.4 out of 10), reflecting widespread dissatisfaction with laboratory infrastructure<sup>(8)</sup>. A subsequent study by the same group found that 90.6% of anatomy students requested more frequent practical sessions, while 54.7% considered existing laboratory visits to be poorly organised<sup>(13)</sup>. These findings mirror our results, where only 30.4% of physiology students reported access to adequate practical session materials, and only 50.0% confirmed the availability of a physiology laboratory. Taken together, these convergent data from two different institutions, two different disciplines, and two different time periods identify the underfunding of practical teaching infrastructure as a systemic and persistent challenge across the pre-clinical curriculum in Senegal, warranting a coordinated institutional and governmental response. Yet the paradox remains instructive: the high level of intrinsic motivation documented in our cohort demonstrates that this structural deficit, while urgent, has not yet eroded students' engagement, a precious asset that targeted investment could substantially amplify.

### **Motivational profile and implications for sustained learning**

Finally, the motivational profile of Year 1 students combines high intrinsic motivation with a mastery goal orientation and majority resistance to surface-learning approaches, with only 34.6% believing that memorising tutorial answers would suffice for examination success, and 82.1% recognising the importance of physiology for their future medical practice. These characteristics are associated with better academic performance and longer-term knowledge retention<sup>(16,17)</sup> and are also predictive of sustained engagement in continuing medical education. They stand in productive tension with

the material and participatory constraints identified in the preceding sections: the depth of student motivation constitutes both the most encouraging finding of this study and the most compelling argument for the institutional investments and pedagogical reforms outlined above.

### Strengths and Limitations

This study presents several strengths. It adopts a multidimensional approach covering five complementary thematic areas, providing an integrated view of students' pedagogical experience. The exhaustiveness of the sample (all Year 1 students were surveyed) strengthens the representativeness of the findings at the cohort level. The use of a validated Likert scale combined with an anonymous questionnaire reduces social desirability bias.

Limitations to be considered include the relatively modest sample size ( $n = 39$ ), which limits statistical power and the generalisability of findings beyond UADB. The cross-sectional design does not permit the establishment of causal relationships. The use of self-reported data is subject to memory and perception biases. Finally, the absence of a comparison group or longitudinal data precludes assessment of how perceptions evolve over the course of the curriculum.

### Conclusion and Recommendations

This exploratory study reveals that first-year medical students at UADB hold an overall favourable perception of physiology teaching, highlighting the quality of the pedagogical relationship and the utility of tutorial sessions. Their intrinsic motivation is high and their learning strategies predominantly deep, constituting valuable assets for academic success.

However, significant areas for improvement emerge. First, improving material conditions is an absolute priority: renovation or construction of appropriate classrooms, acquisition of pedagogical and laboratory equipment, and enrichment of bibliographic resources. Second, strengthening interactive formats, in particular tutorial sessions

and better exploitation of practical sessions, should be incorporated into any revision of the curriculum. Third, strategies aimed at reducing students' participatory inhibition merit development and evaluation.

Despite the infrastructural constraints identified in this study, 1st year students demonstrated high intrinsic motivation and positive perceptions of teaching quality. Strengthening tutorial sessions and improving material conditions should be prioritised as immediate levers to enhance learning outcomes in physiology at UADB and comparable institutions.

Complementary studies including larger cohorts, inter-university comparisons, and longitudinal follow-up would allow for the deepening and confirmation of these findings, in the perspective of continuous improvement of medical education in West Africa.

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