



HOW DO ARAB HIGHER EDUCATION STUDENTS PERCEIVE THE INTERACTION BETWEEN SCIENCE TEACHERS' PEDAGOGICAL PRACTICES, THE LANGUAGE OF INSTRUCTION, AND SOCIO-CULTURAL AND FAMILIAL FACTORS IN SHAPING THEIR MOTIVATION AND ACADEMIC CHOICES IN SCIENCE EDUCATION IN ISRAEL?

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Abstract:

This study investigates the role of the secondary-level science teacher in shaping the academic pathways and scientific identity of Arab students in Israel and its impact on their transition to higher education. The paucity of empirical studies linking teacher practices to the structural context of the Arab minority prompted this investigation into how individual agency interacts with institutional constraints in producing science students. The study adopted a qualitative interpretive methodology through semi-structured interviews with 30 Arab students studying science at various Israeli universities, analyzed using thematic analysis. The findings revealed six main themes highlighting the teacher's role as an academic identity constructor, the tension between indoctrination-based Bagrut culture and university-level critical thinking requirements, and the linguistic and cultural transition shock faced by Arab students. The study concludes that teachers function either as cultural mediators facilitating academic transition or as agents deepening the gap, and that this role cannot be understood in isolation from the socio-political structure. The study recommends reorienting teacher preparation programs towards autonomy-supportive pedagogical practices and reforming school curricula to develop independent scientific thinking and linguistic preparation for university. This study contributes to motivational theories in non-Western minority contexts and provides practical insights for educational policymakers on promoting successful academic transitions.

Keywords: science teacher role, academic identity construction, arab minority students, higher education in Israel, academic transition, bagrut culture, critical thinking, self-determination theory (SDT), social cognitive career theory (SCCT), situated expectancy-

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value theory (SEVT), cultural capital, symbolic violence, qualitative research, semi-structured interviews

1. Introduction

This study seeks to examine how Arab students in Israeli institutions of higher education view the role of secondary-level science teachers in shaping their motivation, academic choices, and transition into science disciplines. The main research question in this study is: How do Arab students perceive the interplay among science teachers' educational practices, teaching language, and sociocultural and family factors in shaping their motivation and academic choices in science education in Israel? Arab male and female students studying scientific specializations in higher education. This curriculum allowed for an in-depth exploration of participants' lived experiences and personal narratives about their academic path from high school to university.

Despite the great human potential within the Arab community in Israel, the presence of Arab students in advanced scientific disciplines in higher education continues to be low (Alfahel, Daher, & Anabousy, 2023). The current literature often attributes this disparity to major structural and economic barriers, such as institutional bias and resource gaps (Arar & Abu-Rabia-Queder, 2019; Lavi & Ben-David, 2020). Another line of research highlights the pedagogical and motivational role of the science teacher in shaping academic ambitions (Fortus & Touitou, 2021). However, presenting this dynamic as a binary choice between structural determinism and teacher agency simplifies a highly complex reality. Contemporary educational research is clearly and increasingly oriented towards the teacher as a savior and not an isolated, but he acts as an active actor within the structural boundaries of the educational institution. Accordingly, the relevance of understanding the academic path of Arab science students requires examining how teachers deal with these structural constraints to influence student choices.

While external structural factors are undoubtedly influential, the qualitative interaction within the science classroom environment remains a critical and controllable variable in shaping students' attitudes toward science majors (Fortus & Touitou, 2021). Motivation is not a fixed quality, but rather a flexible reactive state linked to the learning environment surrounding students. In contrast, many Arab students suffer from the traditional teaching methods based on indoctrination and memorization that are currently prevalent in their schools, which are in stark contrast to the requirements of Israeli academic institutions that focus on high levels of autonomy and critical thinking (Arar & Abu-Rabia-Queder, 2019). The absence of inquiry-based qualitative interaction strategies at the secondary level negatively affects the development of higher cognitive processes (Sankalaite *et al.*, 2023; Okumuş *et al.*, 2019), which reduces students' readiness to face academic challenges in university education.

The transition from high school to higher education in the Israeli context is accompanied by complex linguistic and cultural challenges facing the Arab student. The Hebrew language barrier is a major obstacle, intertwined with deeper conflicts related to the difficulty of building academic identity and a sense of belonging within an academic environment that is predominantly Jewish (Haj-Yehia & Arar, 2021). In this context, supporting a science teacher in high school can act as a vital cultural and identity bridge, bridging the gap between students' local identity and the demands of Israeli academia. By acting as cultural mediators, teachers can mitigate these transitional barriers, an aspect that has not been adequately explored in the current scholarly literature (Alfahel *et al.*, 2023).

Despite these insights, the current literature lacks an in-depth qualitative analysis of how the impact of science teachers in school translates into the actual academic decisions of Arab science students in higher education. Most of the existing research relies on large-scale quantitative data or focuses solely on high school students prior to their transition (Alfahel *et al.*, 2023). This leaves a critical qualitative gap regarding the lived experiences of students who have successfully navigated this transition, particularly the tension between inadequate school pedagogy and the need for academic autonomy.

Therefore, this study seeks to critically examine how Arab science students in Israeli higher education perceive the role of high school science teachers in shaping their academic paths. By moving beyond descriptive analysis and focusing on the teacher as an actor within a structural framework, this research provides a rigorous qualitative understanding of the transition experience. The theoretical contribution of this study lies in proposing an integrated framework that links structural constraints and pedagogical agency, providing actionable insights into education policies and teacher training with the aim of improving the representation of Arabs in the disciplines of Science and Technology.

2. Literature Review

Understanding Arab students' motivation towards scientific disciplines requires a number of theories that explain the relationship between the educational environment and student academic behavior (Eccles & Wigfield, 2020; Ryan & Deci, 2000). At this juncture, motivational approaches are identified with theses of pedagogical practices and socio-cultural variables (Lent & Brown, 2019; Fortus & Touitou, 2021), to form a complex analytical framework that expands the dimensions and features of the academic transition experience among this segment of students.

2.1 Motivation in Science Education

Academic motivation is one of the factors that shape students' choice of scientific majors and the persistence of their interest in science. The literature shows three central theories to explain this phenomenon. First, the theory of self-determination (SDT), which

separates the internal motivation resulting from curiosity and self-interest from the external motivation related to the rewards or pressures of the external environment, and the theory emphasizes that there is an essential condition for the development of the student's sustainable internal motivation represented by independence, competence, and belonging (Deci & Ryan, 2000). Second, according to the Expectation and Value Theory (SEVT), the tendency of a student's choice of a major is influenced by the interaction of two main factors: his expectations for success in the field, and the intrinsic value added to him on a personal level, future benefit, or pleasure (Eccles & Wigfield, 2020). Third, the Social Cognitive Theory of Career Path (SCCT) explains that academic and professional orientations are formed from the mutual relationship between self-efficacy and expectations of personal results and goals, indicating the tendency of students to develop a keen interest in areas from which they are confident of success and expect positive returns, and that this process is dependent on Criticality with barriers and support surrounding the student (Lent, Brown, & Hackett, 1994; Lent & Brown, 2019). In the context of Arab students in Israel, these three frameworks intersect to reveal a complex reality: the traditional school environment often weakens intrinsic motivation by depriving students of independence, while structural and social constraints affect a student's assessment of his or her chances of success and the value of a scientific discipline to him.

2.2 Science Teachers' Pedagogical Practices

The literature highlights that pedagogical methods in the science class play a key role in shaping students' academic orientations and stimulating their motivation towards scientific disciplines (Fortus & Touitou, 2021). Educational research divides into two basic models: the traditional model based on indoctrination, memorization, and information transfer in a unidirectional manner, and the constructivist model based on inquiry, interaction, and knowledge building actively by the student. Studies have confirmed that constructivist inquiry-based teaching promotes critical thinking, academic autonomy, and raises students' internal motivation (Sankalaite *et al.*, 2023). However, many Arab schools in Israel have traditional teaching methods that focus on memorization and repetition (Arar & Abu-Rabia-Queder, 2019), forming a large gap between what a student learns in high school and the high levels of independent thinking and critical analysis required by Israeli academic institutions. This conflict puts the teacher in an important position: a teacher who adopts interactive constructivist practices can act as an enabler that prepares the student for the requirements of higher education, while a teacher who remains within the pattern of traditionalism may inadvertently hinder this transition.

2.3 Language of Instruction and Academic Transition

One of the most formidable impediments facing Arab students in their transition from high school educational institutions in Arabic to Israeli institutions of higher education that adopt Hebrew or English as their primary language of instruction (Haj-Yehia & Arar,

2021). This challenge is not limited to the purely linguistic aspect, but goes beyond difficulties in assimilating specialized scientific terminology, actively participating in lectures and academic discussions, and writing research papers in a language other than the mother tongue. The literature suggests that this language transition is associated with low academic confidence and a sense of alienation within the university environment (Alfahel *et al.*, 2023). In this context, the secondary school science teacher can serve as a vital stepping stone by exposing students to scientific terminology in Hebrew and English, using multilingual learning resources, and preparing students psychologically and linguistically for the requirements of higher education. However, this preparatory role of the teacher has not received sufficient research attention in the current literature.

2.4 Socio-Cultural and Familial Factors

The academic choices of Arab students cannot be considered separately from the social and cultural context in which they live. The Arab community in Israel is distinguished by a collective structure that places great importance on the expectations of the family and the local community in guiding children's academic and professional decisions (Arar & Abu-Rabia-Queder, 2019). Studies indicate that the family plays a dual role: on the one hand, it can be a source of support and motivation by encouraging children to pursue socially prestigious disciplines such as medicine and engineering, and on the other hand, it can impose restrictions on freedom of choice, especially in matters that are not socially recognized.

Arab students, as minorities in predominantly Jewish higher education environments, often face identity conflicts while juggling their cultural heritage with academic pressures (Haj-Yehia & Arar, 2021). In these contexts, science teachers can serve as cultural mediators, guiding students through family and societal expectations while supporting their educational goals. However, research on this role remains limited (Alfahel *et al.*, 2023).

3. Materials and Methods

This study used a qualitative interpretive research design to explore how Arab students in Israeli higher education perceive the influence of secondary science teachers on their academic trajectories. A qualitative approach was selected for its ability to capture participants' lived experiences, beliefs, and values in their natural settings (Bloomfield & Fisher, 2019). Such research aligns with interpretive and constructivist models that emphasize subjective meaning and acknowledge multiple interpretations (Erciyes, 2020). It is particularly valuable for understanding how Arab students interpret their educational experiences within a complex cultural and social framework, as their motivation and academic decisions are multifaceted and cannot be simply quantified.

The main data collection method involved semi-structured interviews, allowing for both guided and open-ended discussions. This format gave participants the

opportunity to elaborate on their views regarding the research topic. It also enabled the researcher to clarify points and explore new topics that emerged during the conversation (Kallio *et al.*, 2016). The interview guide was crafted based on existing literature on academic motivation, pedagogical practices, and cultural factors affecting minority groups. Questions focused on students' experiences with secondary science teachers, their exposure to various teaching methods, the impact of language instruction, the influence of family and society on their educational decisions, and their transition to higher education. All interviews were conducted in Arabic to ensure participant comfort and promote genuine, uninhibited responses.

The study population consisted of Arab students majoring in science at Israeli higher education institutions who completed high school in Arab schools. This group was selected because of its direct relevance to the economic, social, and cultural factors in the Arab context that influence the transition to higher education in science. The sample included 30 male and female students. Purposive sampling was used to select participants with sufficient knowledge and experience to provide meaningful insights (Etikan *et al.*). Selection criteria included their scientific major, educational stage, and willingness to participate. Efforts were made to ensure diversity in gender, specialization, and institution to gather a broad range of experiences. The study received ethical approval, all participants provided informed consent, and all protocols were followed.

4. Results

The results of this study provide an extensive and nuanced understanding of how Arab students in Israeli higher education perceive the role of secondary-level science teachers in shaping their motivation, academic choices, and the trajectory of their transition towards scientific disciplines. The thematic analysis revealed six main themes that reflect the complexity and contradictions of this role, with results indicating a wide range of experiences, from transformative educational practices that contributed to building a student's academic identity to traditional practices or a lack of support that left the student facing the academic transition alone.

Theme 1: Teacher as an Academic Identity Constructor

Some teachers' roles went beyond imparting knowledge to become the makers of their students' academic identity. Phrases such as "*you think like an engineer*" or "*you have a researcher mindset*" helped the student build a new self-image and linked their current abilities to their future career. "*It made me believe that I could actually become a doctor,*" one participant explained, "*You don't see physics as laws but as building materials, and that's the thinking of an engineer.*" One participant described how "*the teacher presented my paper as a model of failure in front of the class... His style shattered my self-confidence.*" Another participant said: "*He didn't do anything to build my faith in my abilities...*" This reveals that the teacher has the power to shape or erode a student's scientific identity.

Theme 2: Examination Culture versus Critical Thinking

A sharp tension emerged between the culture of memorization and repetition in exams and the requirements of higher education based on analysis and intellectual independence. One participant described how his teacher *"would explain the lesson through presentations he read... I used to sleep in the classes because every lesson was the same, there was nothing new in the way he was taught."* *"There was no room for discussion."* A third participant described a teacher *"who emphasized scientific research and gave us texts, but he didn't give us the opportunity to think or guess at the answers ourselves..."* He was like an officer." In contrast, one participant described a different experience: *"He was guiding us to get the answers ourselves."*

Theme 3: Constructing and Undermining Scientific Self-Efficacy

Self-efficacy is not a fixed trait, but rather a continuous process of construction in which the teacher plays a pivotal role, positive or negative. One participant asserted, *"He said to me, 'You have a researcher mentality..."* It opened my eyes to the fact that my love for biology could turn into a career," one participant noted, adding that his teacher was *"so intense that I was studying all day and night for fear of falling with him,"* a motivation based on horror rather than trust. Another participant confirmed: *"What built my belief in my abilities was that I succeeded in the exams alone."*

Theme 4: Arab Students Between Aspiration and Structural Constraints

The teacher does not work in a vacuum but within a system of discrimination, resource gaps, and language barriers. One participant explained: *"Moving to university was a complete language shock..."* One participant noted, *"The family wanted me to be a guaranteed major."* Another participant described how the teacher *"would take us to the lab, but not to do a real experiment just to show the management that he was using the lab, while the lesson itself was normal in the book but changed the place."*

Theme 5: The Teacher as an Emotional and Psychological Agent

The emotional impact of a teacher, positive or negative, extends for years beyond high school. One participant explained: *"He told me: 'The most important thing is not to lose your passion... That sentence still haunts me today,"* one participant confirmed, *"She told me, 'That's the quality of a real researcher... This attitude is not on track."* One participant described it: *"The class was like a military lecture... A relationship built on fear and awe",* another participant asserted, *"He was teaching from fear, not from love."*

Theme 6: The School-University Disconnect

The trauma of moving from school to university was clearly evident in the participants' experiences. One participant said, *"I graduated and felt like I was in front of a completely unknown world."* Another said, *"I arrived at university without any tools."* A different participant described a different experience: *"He was taking the time to talk about the*

difference between school and university... The gap lies not only in the level of difficulty but also in the type of knowledge required: school produces memorizers, and university requires independent thinkers."

5. Discussion

This study seeks to explore the role of the science teacher in shaping the academic pathways and scientific identity of Arab students in Israeli higher education institutions. While previous literature suggests the importance of the teacher's role as a motivational supporter (Ekmekci & Serrano, 2022), the results of this study reveal a more complex and contradictory reality. The role of the teacher in the Arab context is not only to be an "inspiration" or a transmitter of knowledge, but also to act as an "identity constructor" within a restricted educational system and a complex social and political structure. The tension between positive and negative student experiences highlights the deep gap between the school's "matriculation" culture and the university's demands for academic autonomy. This tension cannot be explained solely by individual motivational theories and requires structural analysis.

Findings regarding the role of the teacher as a producer of academic identity (Topic I) and building self-efficacy (Topic III) are consistent with the Social Cognitive Theory of Career Path (SCCT) (Lent & Brown, 2019), which asserts that self-efficacy is shaped through verbal and social persuasion. When teachers use language such as "*you have a researcher-mindedness*," they are not just providing emotional support, but rather building a student's academic self-efficacy and expanding their professional imagination. However, parallel negative experiences emerge, such as those of Zayn Fadi, suggesting that this role can be destructive. This contradiction is in line with the critique of the SCCT model in minority contexts (Navarro *et al.*, 2007); in the absence of structural support, the teacher's influence becomes the only source of academic validation, giving him exceptional authority that can be transformed into an exercise of symbolic power in Bourdieu's concept (Bourdieu, 1986).

Moreover, the tension between "matriculation culture" and critical thinking (the second theme) reveals a structural problem that transcends pedagogical approaches. Through the lens of self-determination theory (SDT) (Deci & Ryan, 2000), this tension can be explained as the result of a controlling environment that lacks autonomy support. The reliance on indoctrination and typical answers deprives students of the opportunity to meet their need for independence and competence, resulting in "extrinsic motivation" rather than "independent researchers" who are internally motivated. This approach is consistent with the science education literature, which asserts that traditional practices impede the development of independent scientific thinking (Fortus & Touitou, 2021).

In the context of structural constraints and academic transition (Themes IV and VI), the Theory of Expectation and Value (SEVT) (Eccles & Wigfield, 2020) provides a framework for understanding the shock of transition. For the Arab student, the choice of

science majors is often driven by high "utility value" as a social mobility strategy, driven by strong family and societal pressures to overcome structural discrimination in the Israeli labor market (Arar & Abu-Rabia-Queder, 2011). However, this ambition encounters an enormous psychological and linguistic "cost" when moving to university, as the Hebrew language is a barrier that hinders belonging and destabilizes efficiency. The teachers who succeeded in closing this gap were those who served as "cultural mediators", providing their students with the cultural and linguistic capital necessary to navigate the new academic field, thereby emphasizing the importance of the structural dimension in analyzing academic transition (Haj-Yehia & Arar, 2021).

The main contribution of this study lies in challenging the romantic narrative of the "hero teacher." By highlighting the contradictions and tensions in students' experiences, the study shows that the Arab teacher works within an educational system marked by resource gaps and rigid evaluative orientations, which limit his or her ability to foster critical thinking. Thus, the success of some students in overcoming the trauma of academic transition is not merely the result of individual abilities or fleeting inspiration, but rather the product of a complex process of negotiation between individual agency and structural constraints.

The limitations of this study are the limited sample of Arab students in Israeli universities, which may not reflect the experiences of all minorities across different contexts. Reliance on retrospective interviews may also be influenced by memory biases. In the future, longitudinal studies that track students from high school to university graduation are recommended, as well as studies that explore the perspectives of teachers themselves to understand the structural challenges they face in the field.

6. Conclusion

This study sought to understand the role of the science teacher in shaping Arab students' academic paths in Israel and their transition to institutions of higher education. By analyzing the experiences of 30 university students, the study concludes that the teacher is not just a carrier of scientific content, but a central actor in building or undermining a student's "academic identity." The results revealed a complex educational reality characterized by a deep tension between traditional educational practices that perpetuate a memorized "bagrut culture" and the requirements of higher education that require independence and critical thinking.

The study shows that the success of Arab students in penetrating scientific disciplines in Israeli universities cannot be explained in isolation from the structural and social context. Students face a severe linguistic and cultural transition shock, driven by family pressures that see science as an essential means of social mobility. In this restrictive context, the role of the teacher emerges as a "cultural mediator" who can provide students with the cultural and psychological capital necessary to navigate a strange academic

environment, or, conversely, it may deepen their sense of alienation and low self-efficacy. His role was limited to strict indoctrination.

In practical terms, these findings underscore the urgent need for structural reforms in Arab secondary schools, beyond the narrow focus on achievement in national exams to include the development of independent scientific thinking skills, and the linguistic and psychological preparation of students for university requirements. Teacher preparation and training programs should focus on providing them with pedagogical tools that support autonomy, enabling them to exercise their role as transformative actors capable of breaking the cycle of social reproduction.

Despite the important contributions of this study, it is limited to retrospectively analyzing students' perspectives. Therefore, there are open questions about how teachers themselves perceive their role under the institutional constraints they face. These determinants point to promising future research directions, calling for the study of teachers' interaction with educational policies and the impact of the immediate school context on their ability to adopt constructive and supportive practices, which will contribute to providing a more holistic picture of the mechanisms of student scientific production in minority contexts.

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Conflict of Interest Statement

The author declares no conflicts of interest.

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