

Being “STEM-trygg” as a proposed concept for feeling at home in STEM

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Abstract

Conversations with educators in Sweden have led me to reflect on the gap between research language and everyday pedagogical work. Science capital offers a useful research concept, but educators may find it difficult to use when planning activities or discussing people's experiences. This has inspired me to propose a complement: STEM-trygg. I use STEM-trygg as an expression for feeling able and welcome to engage in science, technology, engineering and mathematics while recognising that one's knowledge is incomplete. The corresponding noun, STEM-trygghet, names that experience in a particular setting. I propose the expression as support for educators and science centre staff, who create opportunities for children, young people and adults to explore how the world connects and works. These experiences can range from atoms and artificial intelligence to ecosystems and equations, bringing subjects together around questions that matter to visitors and learners. As I navigated the complement, I used a purposive conceptual analysis of fifteen sources, spanning research and studies on preschool science play, school pedagogy and informal science learning. This was condensed down to four dimensions: perceived legitimacy, interpersonal security, confidence to engage and familiarity with engagement. They overlap with existing concepts, including science capital, self-efficacy, science identity, belonging and psychological safety. STEM-trygg may help educators move beyond grades to focus on the democratic aspects of education, discuss engagement, and consider how the experiences they create and plan could develop, support, and encourage science capital and lifelong learning.

Keywords: STEM-trygg, STEM-trygghet, science capital, educational practice, preschool, science centres, interdisciplinary learning, lifelong learning

1 Introduction

2025, Sweden adopted a new overarching STEM strategy with ambitious goals to promote education in STEM subjects. This was motivated by the idea that “Efforts to reinforce Sweden’s position as a leading technology nation begin in school. We need more people with extensive knowledge in the fields of science, technology, engineering and mathematics, and we need to get them interested at an early age. The entire education chain, from preschool to postgraduate study, plays an important role in this.” (Government of Sweden, 2025). This decision has had an impact in Sweden, not yet in the number of increased students within certain fields, but more and more research about STEM has been published, and it has made educators in the forms of learning mentioned and science centres more aware of STEM as an acronym and the complexity of transforming a non-Swedish expression into a Swedish learning setting. For example, Swedish technology education can be seen as spanning all STEM subjects yet not fitting neatly into any of them. It is its own entity, not computer literacy, computational thinking, or AI literacy, as might come to mind in another global Northwest setting (International Technology and Engineering Educators Association, 2020). As educators seek to understand

what STEM means for them, they also use conceptual frameworks like science capital to understand how an individual's background, social connections, and daily experiences shape their relationship with STEM (Archer et al., 2015; DeWitt et al., 2016). This complexity can create tension for educators as they navigate research on STEM and what STEM can be for them and the learners they meet.

2 Why propose STEM-trygg?

After meeting with thousands of educators in Sweden, I keep returning to a practical question. How can a useful research concept also become useful in an educator's everyday work? Science capital helps researchers think about people's relationships with science, yet the term may offer less help¹ when a teacher plans an activity, responds to a child's question, or discusses a visit with science centre staff. The STEM acronym can help researchers study varied areas, such as integrated schoolwork, specific disciplines, and recruitment policies. These areas can help in many ways, but how might they affect educators?

Now let me introduce STEM-trygg more closely. I propose STEM-trygg as a complementary concept educators can use in their own settings. I see a need for a concept that moves beyond results and grades and focuses more on the democratic aspects of having knowledge in/trough/of STEM. The concept offers a way to ask whether people feel able and welcome to explore STEM, even when they do not yet understand a topic. As STEM and science capital are useful research concepts STEM-trygg aims to help bring a related question about people's experience of engagement into everyday discussion. I propose a Swedish expression because the idea grew from conversations with educators in Sweden, and I want it to connect with their everyday pedagogical language. I use *trygg* to capture a sense of security, confidence, and belonging when engaging with STEM, even when knowledge is incomplete. For international readers, “feeling at home in STEM” offers a way to explain the intended meaning while keeping the proposal rooted in the context that inspired it.

Can I join in before I know the answer? A child trying a ramp, a pupil offering an uncertain explanation and an adult approaching an unfamiliar exhibit can all face that question. Educators may already recognise these situations without using the same words to describe them. I suggest that STEM-trygg could provide a shared expression for discussing what makes engagement feel possible. Whether educators find it useful remains a question to investigate. The proposed complementary concept concerns both educators who work with STEM and science centre staff who design experiences for wider audiences. Their activities can place knowledge in a larger context, connecting subjects to help children, young people and adults explore how the world works. I see STEM-trygg as supporting that work while keeping knowledge, critical questioning and access in view. Feeling welcome matters to the proposal, but it does not, on its own, tell us what someone has learnt or whether or not what they learnt matters.

The proposal can be seen as overlapping with Hartmut Rosa's concepts of resonance and alienation, but I aim to give it a narrower purpose. Rosa (2018) describes resonance as an encounter that affects us, invites a response and transforms our relationship with the world, without allowing us to control the outcome. I use STEM-trygg to describe feeling able and welcome to engage, without requiring such a transformative encounter. A science centre visitor could therefore feel STEM-trygg during an activity that leaves them unmoved. Equally, uncertainty or low confidence does not, by itself, establish alienation, which Rosa associates with a lack of meaningful, responsive connection. I propose STEM-trygg as practical language for educators, while leaving its relationship to resonance open to further investigation. This paper asks what STEM-trygg could mean, how it relates to existing research and how educators and researchers might explore its usefulness. I offer a definition, practical questions and a research agenda. I do not claim that the experiences are new or that the expression already describes a distinct research construct.

¹ and in my understanding science capital does not claim to act as that kind of support to teachers

3 What being STEM-trygg means

I use being STEM-trygg to mean feeling able and welcome to engage with STEM in a particular setting, including exploring, asking for help and acknowledging uncertainty. A person can take part without expecting limited expertise to disqualify their contribution. STEM-trygg is the adjective; STEM-trygghet names the experience. I draw on the Swedish word trygg to bring together security, confidence and a sense of being at home. This is the meaning I propose here, rather than an exact translation or a claim that Swedish offers a unique description.

The setting forms part of that meaning. Someone might feel STEM-trygg during a science centre activity but less so in an assessed lesson. Another might feel comfortable exploring with a familiar adult and hesitant in a new group. When educators discuss the experience, they need to ask where it occurs, what the activity involves and who takes part. We should not assume that someone carries the same feeling into every STEM encounter. Being STEM-trygg allows room for difficulty. A person can feel uncertain, encounter a demanding task and still expect support to continue. Confidence also needs to sit alongside knowledge and sound judgement. The concept includes questioning a scientific or technical claim and asking how evidence supports it. Agreement with an educator or expert does not define the experience. For young learners, engagement may involve gestures, movement, materials or shared play. They do not need to name STEM or explain an abstract relationship to it. For older learners and adults, it may include discussion, investigation or bringing an everyday experience into a technical conversation. These possibilities give the proposal a broad starting point. Research should test what the expression means across ages, subjects and settings.

4 How I developed the proposal

My conversations with educators have inspired this proposed complementary concept. These conversations motivate my thinking and choices as I explore what this complement could be; they are not evidence from a study of educators. I have used a purposive conceptual analysis (Palinkas et al., 2015) to develop my thoughts. During preparation and revision in September and October 2026, I conducted public web searches using terms related to science capital, self-efficacy, science identity, belonging, psychological safety, preschool science play, and science centre inclusion. Further searches addressed Rosa's account of resonance and alienation, Nyström and colleagues' work on resonance in science education, and my own work on girls' technical activities and self-images. Searches by author, title and DOI helped check the references. Publisher pages, university records supplied publication details and abstracts, and accessible article passages provided further context. This process did not involve an exhaustive database search, a formal assessment of study quality, or an estimate of combined effects. From this I selected fifteen sources. Nine works published between 1977 and 2018 provide conceptual or methodological context. Six works with final citation years of 2024 or 2025 connect the discussion to preschool, school, higher education and informal science learning. I selected these to support a focused discussion, they cannot establish how much the whole field agrees with the proposal.

I began by giving STEM-trygg a working meaning. I then compared it with neighbouring concepts, considered its possible use in three educational settings and developed questions that could support or challenge it. The hypothetical examples help make those steps concrete. They describe possible activities, not observations I collected. My conversations with educators informed the starting question, but I did not record or analyse those conversations as research data. I checked the authors, titles, publication details and DOI links against publisher or institutional records. Appendix A shows what each source contributes and where I limit its use. Some summaries rely on abstracts, so they do not imply that I appraised a full study. I keep accounts of prior research

separate from my interpretations and from proposals for future work. The twelve sources do not test STEM-trygghet, and this paper reports no empirical findings about it.

5 How the proposal relates to existing research

Science capital offers an important starting point. Archer et al. (2015) develop the concept through science-related forms of cultural and social capital and examine its distribution among secondary-school pupils in England. DeWitt et al. (2016) examine relationships between its dimensions and anticipated participation and identity. Their work helps keep resources and social conditions in view. I propose STEM-trygg as a way to discuss a related experience of engagement, while recognising that resources and experience overlap. These studies do not establish that science capital causes STEM-trygghet. Self-efficacy concerns expectations about what one can do (Bandura, 1977). This is close to the confidence to engage that I include in the complementary concept proposal. Someone might expect to solve a problem yet hesitate to ask a question in a particular group. That example suggests a possible distinction between capability and a feeling of welcome. Belonging may already explain much of what feeling at home means. Good et al. (2012) study mathematics belonging among university students, including its relationship with future intentions and perceptions of messages in the learning environment. I use that work to keep belonging central to the comparison. Its population and subject limit direct claims about preschool children or science centre visitors. Researchers could investigate whether STEM-trygg adds anything useful to an existing account of belonging. Science identity highlights how people see themselves and how others recognise them. Carlone and Johnson (2007) examine fifteen successful women of colour in higher education and science-related careers, focusing on how their identities are recognised. I use their account to ask whose contributions receive recognition. STEM-trygg would allow a person to engage without calling themselves a science person. That is a possibility within my definition, not a finding that this paper establishes. Adult identity research also cannot directly describe preschool children's experiences. My own research (2024) on girls' relationships with technology helps me consider being seen as technical as a social position, shaped by gender norms and judgements about what counts as technical activity. I have examined the complex relationship between girls' technical activities and how they see themselves in school and out-of-school settings. I draw on this work to ask whose knowledge and contributions receive recognition as technical. For STEM-trygg, that question concerns the social conditions of feeling able and welcome to engage, alongside a person's skills. Educators in preschool, school and science centres could examine whether their expectations recognise different ways of taking part.

Psychological safety concerns interpersonal risk. Edmondson (1999) studies it as a shared belief in organisational work teams. Asking for help or admitting uncertainty can raise related questions in education, but the present proposal concerns a person's experience in a STEM activity. Researchers would need to justify any move from a team-level workplace concept to an educational setting. A suitable account of psychological safety might already do the work I propose for STEM-trygg. Rosa's account of resonance offers another close comparison. Rosa (2018) describes an encounter that moves a person, invites a response and transforms their relationship with the world in ways they cannot fully control. Resonance can involve difficulty or disagreement; it does not simply mean comfort. He describes alienation as a relationship without meaningful, responsive connection. This account draws attention to relationships with people, materials and the wider world, as well as the social conditions that allow such relationships to develop. Nyström et al. (2025) bring this perspective into science education. Through life-history interviews with three university physics students, they analyse how physics, materials, and relationships with other people become meaningful in the students' lives. Their analysis considers experiences within and beyond formal education. I draw on this study to ask how science can become meaningful, alongside whether someone feels able and welcome to engage. These accounts do not establish effects for preschool children, school pupils or science centre visitors, and they do not test STEM-trygghet. I give STEM-trygg a narrower purpose, helping educators discuss the experience of feeling able and welcome to engage in a particular STEM setting. A visitor might feel STEM-trygg while

exploring an exhibit without finding the encounter transformative. Equally, uncertainty or low confidence does not, by itself, establish Rosa's alienation. STEM-trygg may overlap with the conditions that support resonance, but I do not propose it as either a requirement or a guarantee. This distinction clarifies my intended use; it does not establish an independent construct. Researchers should explore whether the expression helps educators discuss something that resonance, belonging or existing concepts already describe. Agency can add another useful question - can people influence what happens in an activity? The preschool studies discussed below examine children's initiatives and teachers' responses. I distinguish those opportunities and actions from the experience of feeling able and welcome to engage. An observer cannot read a child's feeling of security directly from an action. Recognising that limit helps educators use STEM-trygg as a question about experience rather than a label based on behaviour.

6 Four questions for educational practice

I suggest four dimensions as a starting point for discussion. I call them perceived legitimacy, interpersonal security, confidence to engage and familiarity with participation. Each gives educators a question they can bring to an activity. They form a working set of prompts if you will, not a scale or a checklist that classifies people.

- Perceived legitimacy asks whether a person feels that their contribution has a place. An educator might ask whose questions we notice and what happens when someone brings an everyday experience into the discussion. The focus is on a person's experience of having something to contribute, even when they lack specialist knowledge.
- Interpersonal security asks whether a person expects a respectful response to uncertainty or mistakes. An educator might ask can someone say that they do not understand, and can they try again after an unexpected result? Security here refers to an expectation about other people's responses. It does not establish the objective safety of an activity.
- Confidence to engage asks whether a person feels able to begin exploring, seek help or offer an interpretation. An educator might ask whether we have provided a way to start that makes sense to this person. The question concerns confidence to take part, alongside the knowledge and support that an activity requires.
- Familiarity with participation asks whether a person understands how to enter and navigate an activity. A visitor may not know whether to touch an exhibit, watch a demonstration or ask a facilitator. An educator might ask: have we made the invitation and the available forms of participation clear?

These dimensions overlap with each other and with established concepts. Researchers may find that self-efficacy, belonging, recognition, psychological safety or prior experience already explains them. I therefore propose them for discussion and investigation, with no total score, weighting rule or threshold. Their practical value may lie in helping educators notice questions about their setting, even if they do not form a distinct psychological construct.

7 Preschool and school activities

In preschool, science can become part of play, exploration and shared attention. Henriksson, Leden, Fridberg and Thulin (2025) examine how a teacher connects science content with play among children aged 1-4. Henriksson, Fridberg and Leden (2025) analyse activities with children aged 2-4 and describe how teachers respond to their initiatives. These qualitative accounts help frame a question about whose contributions receive space in an activity. They do not measure STEM-trygghet or establish effects on later engagement. Consider a hypothetical ramp activity. A child changes the ramp, releases a toy and watches it stop. The teacher might

notice the child's gesture, offer another material and help the group investigate. Hallström, Elvstrand, and Hellberg (2015) noted that teachers encourage boys and girls to use technology differently. However, older children using technology in free play often receive little or no support, while children who do not use or build with technology are not encouraged to do so, a finding that adds another layer to the how get to be STEM-trygg. STEM-trygg gives educators a way to discuss whether the activity makes room for the child to explore and seek support. They still need to consider language development, sensory preferences, relationships and the child's choice to observe. Visible participation alone cannot tell them how the child feels. In school, Archer, King, Godec and Chowdhuri (2024) examine the science capital teaching approach in relation to culturally sustaining pedagogy. Their account draws on work with primary and secondary teachers and teacher educators and attends to learners' resources and power relations. I use it to ask how teaching recognises what pupils bring to an activity. The article does not test whether particular practices cause STEM-trygghet. A hypothetical pupil offers an explanation that the evidence does not support. The teacher can correct the explanation while keeping the pupil involved in the investigation. Educators could discuss whether pupils expect that kind of response, and whether their expectations change during assessment. The proposal keeps learning and participation together without assuming that a feeling of welcome ensures an accurate explanation.

Teachers and science centre staff could also use the expression when planning a group visit. They might discuss what pupils already know, how they can enter an unfamiliar activity and what opportunities they will have to ask questions afterwards. Those conversations could help connect experiences across settings. Whether the experience of being STEM-trygg carries from one setting to another remains a question for research.

8 Science centres and a larger context for knowledge

I also propose STEM-trygg as support for science centres that bring knowledge to life through experiences. Their programmes can range from atoms and artificial intelligence to ecosystems and equations. I am interested in how centres can place these topics in a larger context, bringing subjects together so that children, young people and adults can explore connections and ask how the world works. STEM-trygg would keep a question about engagement present within that ambition: does the person feel able and welcome to take part? The larger context can begin with a question rather than a subject boundary. In a hypothetical activity about an ecosystem, visitors might observe living things, count what they notice and discuss how different ways of representing the observations affect their interpretation. An activity about artificial intelligence might invite questions about data, evidence and human decisions. Educators could connect observations, models and equations across such experiences while making clear what each can and cannot explain. These examples illustrate an interdisciplinary approach, they do not report effects of an activity. How does an experience become an invitation to understand more? A visitor might recognise a connection to their own life, ask a question they had previously kept to themselves or seek another explanation. I would like if a concept like STEM-trygg to help staff discuss these possibilities, including with visitors who do not describe themselves as interested in STEM. They can explore the experience alongside what visitors learn, how they reason and which opportunities they can access.

Informal settings do not automatically welcome everyone. Dawson (2014) examines exclusion among low-income participants from minority ethnic community groups in London and identifies expectations about knowledge, language and resources. Dawson et al. (2024) examine how educators navigate competing equity discourses across four informal learning organisations, including a science centre. I draw on these studies to keep institutional conditions in view. They neither test STEM-trygghet nor represent every science centre. At a hypothetical exhibit, a visitor approaches a mechanism but does not know how to begin. A facilitator could explain the invitation, offer different ways to explore and respond to questions. Staff could then ask how the visitor experienced the interaction. They should also examine cost, transport, language and sensory accessibility. A welcoming conversation cannot, on its own, resolve all the conditions that affect access.

I see each visit as an opportunity for a science centre to reflect on how its experiences might develop visitors' science capital and support lifelong learning in science, technology and mathematics. A centre could use a visit to ask what people bring with them, which contributions its activities recognise and what visitors want to explore next. This would also offer starting points for research on learning over time. An individual visit supplies only part of that picture; claims about lasting change in once sense of STEM-trygghet require follow-up. Biodiversity preservation can form part of this educational purpose. A centre might connect an ecosystem experience to questions about care, choices and opportunities to act. Here I would use STEM-trygg to ask whether visitors feel able to explore those questions, including when they find the science difficult. Understanding biodiversity, feeling welcome to discuss it, acting to protect it and achieving an ecological outcome are different things.

This places STEM-trygg alongside wider ambitions without making it stand for all of them. Science capital concerns resources and their significance; lifelong learning concerns engagement and learning over time; biodiversity preservation concerns an environmental purpose. I propose STEM-trygg to help educators examine a person's experience within that work. The expression could support careful discussion of the connections, without replacing the concepts or the evidence they need.

9 Exploring usefulness with educators and learners

One valid question to start with is how Swedish and English expressions relate; translation alone does not establish equivalent meaning when we agree or disagree on a distinction we can go further. The first test can be practical. Does STEM-trygg help educators describe a situation, ask a useful question or make a decision about an activity? Researchers could explore this with teachers and science centre staff, including people who find the expression unhelpful. They could compare discussions that use it with discussions that use existing language about belonging, confidence or inclusion. My experience of wanting a more accessible expression does not establish that other educators need or prefer it. Flake et al. (2017) explain why construct validation needs evidence beyond internal consistency. I use that argument to keep the proposed dimensions open to revision. Researchers could compare them, examine whether they form a defensible pattern and test any claim that they add explanatory value. Reporting negative findings and protecting participants when sharing data or materials is fundamental. A science centre interested in lifelong learning could follow experiences across visits and later activities. A centre interested in science capital could, for example, investigate changes in relevant resources alongside the experience of engagement.

10 Limits of the proposal

I offer the Swedish word STEM-trygg as a proposed complement for educational practice. The fifteen sources in this paper help develop the discussion, but they do not establish that the expression is useful or that it names a distinct measurable attribute. The selection includes theory, surveys, qualitative accounts and methodological discussion. These offer different kinds of evidence, rather than a combined demonstration of an effect. My access to sources and my choices may, and surely have, also left out relevant alternatives. Much of the literature considered here concerns science, alongside mathematics belonging and informal STEM learning. It does not establish that the same experience spans all STEM subjects, age groups or languages. Researchers should also consider subject-specific anxiety and other explanations. People may understand trygg differently, and they may not find the expression helpful. The proposal should change if it confuses educators, fails to reflect learners' experiences or adds little to existing concepts. It should also change if its use encourages staff to label people rather than question their activities. A person may reasonably choose to watch, remain quiet or decline to take part. STEM-trygg should leave room for those choices. It should not require visible enthusiasm or suggest that a hesitant child has a personal non-interest.

11 Conclusion

Conversations with educators have led me to look for an expression that connects research ideas with everyday pedagogical questions. I propose STEM-trygg as one possible complement: feeling able and welcome to engage with STEM while recognising incomplete knowledge. STEM-trygghet names that experience in a particular setting. I understand the complexity of offering a Swedish term as a complementary concept to an otherwise Anglocentric concepts, but maybe there can also be strength in connecting national, regional or language-specific terms to established concepts to make it grow and connect. Here I am thinking of words like Bantu African *Ubuntu*, Finnish *Sisu* and Danish *Hygge*, which have come to create meaning outside their origins. I offer the concept to educators and science centre staff as something to discuss, try and investigate. Preschool play, school activities and science centre experiences provide different places to explore its usefulness. Science centres can bring knowledge about atoms, artificial intelligence, ecosystems and equations into a larger, interdisciplinary context. Within that work, STEM-trygg could help staff ask whose questions get space and how people find ways into further learning. Developing science capital, supporting lifelong learning and contributing to equality and biodiversity preservation remain wider ambitions that need their own evidence. The next step can be to examine whether the expression helps educators and learners make sense of engagement alongside the concepts they already use.

Declarations

Note that this paper reports no collected or analysed participant data. Personal conversations motivated the proposal, but I did not treat them as research data. Appendix A records source use and limits. The paper supplies no validated instrument. The conceptual analysis involved no recruitment or collection of participant data. Future researchers must obtain applicable ethical review and consent and follow relevant data-protection requirements. The author used Grammarly and ChatGPT for grammar assistance and paragraph structure. The author retains full responsibility.

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Appendix A Source use and limits

This appendix makes the literature's role in the argument explicit. Abstract-based summaries do not imply a full appraisal. The links in the reference list identify the sources. No source below tests STEM-trygghet.

Source and material used	Contribution to this argument	Limit on inference
Archer et al. 2015 UCL abstract	Science-related capital and its distribution among secondary-school pupils in England.	Conceptual background; associations do not establish causes or the proposed construct.
DeWitt et al. 2016 UCL abstract	Survey analyses linking dimensions of science capital to anticipated participation and identity.	An account of related resources and outcomes, not evidence of distinct STEM-trygghet.
Bandura 1977 Author abstract reproduced by Stanford and PubMed metadata	Self-efficacy as expectations concerning action; a theoretical framework developed through treatment research.	A neighbouring concept; no direct test of preschool, school or science centre applications here.
Carlone and Johnson 2007 Publisher abstract	Recognition and identity trajectories of fifteen successful women of colour.	Higher education and careers; no direct inference about young children or a distinct feeling of welcome.
Good et al. 2012 PubMed abstract	Mathematics belonging, future intentions and perceived environmental messages among university students.	Domain and population limits; relationships do not establish the present proposal.
Edmondson 1999 Harvard abstract	Team psychological safety and learning behaviour in organisational work teams.	Different unit of analysis; an educational adaptation requires justification.
Flake et al. 2017 Article abstract and conceptual passages	Construct validation and the insufficiency of internal consistency alone.	Methodological rationale, not validation of the candidate dimensions or prompts.
Henriksson Leden Fridberg and Thulin 2025 Publisher abstract and methods passages	Responsive links between science content and play with children aged 1-4.	Qualitative activity analysis; no measure of subjective trygghet or later participation effects.
Henriksson Fridberg and Leden 2025 Publisher abstract	Narratives of children's initiatives in science play with children aged 2-4.	Agency and adult responses, not direct measurement of the proposed subjective experience.
Archer King Godec and Chowdhuri 2024 UCL abstract	Science capital teaching, culturally sustaining pedagogy and recognition of learners' resources.	Pedagogical and conceptual interpretation; no causal test of STEM-trygghet.
Dawson 2014 UCL abstract	Qualitative accounts of exclusion in informal science institutions among community groups in London.	Context-specific barriers; no estimate for all science centres or the candidate profile.
Dawson et al. 2024 Publisher abstract and methods passages	Equity discourses among seventeen educators in four informal learning organisations.	Examines educator practices; does not estimate participant-level effects on STEM-trygghet.

Source and material used	Contribution to this argument	Limit on inference
Rosa 2018 Author's theoretical essay in Global Dialogue	Resonance, alienation, transformation, unpredictability and the social conditions of responsive world relationships.	Conceptual comparison; no test of STEM-trygghet or evidence that trygghet is required for resonance.
Nyström et al. 2025 Article abstract, theoretical and methods passages	A resonance-based analysis of life-history interviews with three university physics students, spanning formal and informal experiences.	Qualitative accounts from university students; no causal or population-wide conclusions and no validation of STEM-trygghet.
Sultan 2024 Thesis abstract and bibliographic pages	Gender norms, technical activities and girls' self-images in school and out-of-school settings.	Interpretative comparison; no test of STEM-trygghet or generalisation across STEM settings.

Svensk populärvetenskaplig sammanfattning

Att vara STEM-trygg innebär, enligt detta förslag, att känna sig kapabel och välkommen att utforska naturvetenskap, teknik, ingenjörsvetenskap och matematik, även när den egna kunskapen är ofullständig. Man ska kunna ställa frågor, pröva idéer och be om hjälp utan att förvänta sig att bristande kunskap gör att ens bidrag avfärdas. STEM-trygghet beskriver den upplevelsen i ett visst sammanhang.

Förslaget till detta begrepp växte fram ur samtal med pedagoger i Sverige som börjat arbeta med sina delar av Sveriges STEM-strategi som lades fram 2025. Forskningsbegrepp som vetenskapligt kapital och akronymer som STEM kan hjälpa oss att förstå människors relation till naturvetenskap och teknik, men ibland ligger de långt från vardagens pedagogiska utmaningar och frågor. Det svenska uttrycket STEM-trygg är tänkt att ge pedagoger i förskola, skola och personal på science center ett gemensamt språk för att diskutera hur deltagande upplevs och vad som gör det möjligt. Det handlar om att se förbi meritvärden och provresultat och istället fokusera på det demokratiska uppdraget och ge varje person vi möter en möjlighet att känna sig trygg i ämnena och på så sätt kunna navigera i sitt nu och sin framtid.

Fyra frågor konkretiserar förslaget

- Känner jag att mina frågor och idéer har en plats här?
- Förväntar jag mig ett respektfullt bemötande när jag inte förstår eller gör fel?
- Känner jag att jag kan börja utforska och söka hjälp?
- Förstår jag hur jag kan delta i aktiviteten?

I förskolan kan frågorna handla om hur pedagogen uppmärksammar ett barns försök att undersöka material under lek. I skolan kan det handla om hur en lärare bemöter en elevs felaktiga förklaring och samtidigt ger eleven möjlighet att fortsätta att undersöka. På ett science center kan personalen tydliggöra hur besökaren kan närma sig en utställning och utforska sambanden mellan exempelvis ekosystem, artificiell intelligens och matematiska modeller, även om besökaren saknar viss kunskap om ämnena. Förslaget riktar också uppmärksamheten mot omgivningens förväntningar. Att bli sedd som teknisk handlar även om socialt erkännande, som exempelvis vilka aktiviteter som räknas som tekniska och vems kunnande vi uppmärksammar. Pedagoger behöver därför reflektera över både sina aktiviteter och sina föreställningar om deltagarna. Att någon är tyst eller väljer att observera säger inte i sig hur mycket kunskap personen bär på eller hur trygg personen känner sig.

Jag presenterar STEM-trygg som att handla om en viss situation. En person kan känna sig välkommen att utforska på ett science center men tveka under en lektion som rör samma ämne. Trygghet utesluter heller inte svårigheter, osäkerhet eller kritiska frågor. Texten presenterar ett begreppsförslag med stöd i tidigare forskning. Den visar ännu inte att uttrycket förbättrar deltagande eller lärande. Nästa steg är att undersöka om STEM-trygg hjälper pedagoger och deltagare att förstå sina erfarenheter och om det tillför något utöver befintliga begrepp.