

Teacher Beliefs in Higher Education

L.E. Ferguson, *Kristiania University College*

ABSTRACT: Higher education teachers' beliefs about knowledge (epistemic beliefs) likely influence their practice. In this paper I present relevant literature and tentative findings from a small exploratory pilot study on teachers' beliefs about evaluating information about education from the internet, suggesting that they value personal sources of knowledge more than they appreciate the need to critically evaluate claims considering multiple informational sources about education. Though based on a small sample ($N = 11$), these findings align with literature on teacher beliefs that forwards the idea that higher education teachers' epistemic beliefs are based on prior experiences. In light of this tentative finding, as well as intervention research on epistemic beliefs, I present proposed features of an intervention to encourage belief changes in teachers at the tertiary level that are enrolled in educational training programs. Intervention components include having teachers engage in reflection on existing epistemic beliefs and implications for practice, as well as encouraging them to act in accordance with their research-based beliefs in their daily practice. Given the size of this study and its building on research at the primary and secondary levels, as well as some research from higher education, the paper should be seen as a tentative suggestion for future intervention research.

1 INTRODUCTION

1.1 Teacher beliefs

The role of teaching in higher education has received increased attention of late, with recent national measures, such as “Quality Culture in Higher Education” (Ministry of Education and Research 2016-2017), requiring teachers to document evidence of a systematic approach to teaching, including attainment of “foundational knowledge” of pedagogical research. However, the role that educational courses play for teachers in higher education may depend on the influence of their pre-existing beliefs about key facets of education such as teaching, learning and knowledge (Ferguson & Luimes, 2020; Pajares, 1992). Since teachers at the tertiary level are likely to have fairly stable belief systems that have been developed through vast experience in the classroom, these beliefs should be addressed in compulsory courses, and interventions to change beliefs may be necessary to change teaching practice.

The role of teachers' beliefs (their existing perceptions or convictions) has been gaining research interest for the last 65 years or so, since researchers transitioned from studying teachers' behaviours, to their underlying cognitions and belief systems (Ashton, 2015). Belief systems are held to be “far more influential than knowledge in determining how individuals organize and define tasks and problems and are stronger predictors of behaviour” (Nespor, 1987, p. 321). More specifically, teachers' beliefs have been shown to filter and guide their understanding of complex tasks (Buehl & Fives, 2016), and this is thought to be particularly true of their beliefs about teaching, learning and knowledge. For example, views of teaching as transfer of knowledge can be contrasted with more constructivist and student-centred views that will likely influence how teachers behave in the classroom. Likewise, teachers that conceive of students' learning ability as malleable and effort-based, rather than fixed, may exert more effort and patience in their interactions with struggling students. And those with views of knowledge as tentative, rather than fixed, and who acknowledge the need for corroboration across sources and critical thinking in meeting with different knowledge claims, rather than relying on gut feeling or personal interpretations, are more likely to encourage students to engage in active knowledge construction processes, perhaps through involving them in research projects.

Teacher belief researchers have thus far mainly focused on teachers at the primary- and secondary-level, with “research suggest[ing] that preservice teachers enter preparation programs with confidence in their ability to teach and a lack of appreciation for the complexity and uncertainty of the teaching-learning relationship” (Weinstein, 1990, p. 279), and importantly, that beliefs influence practice (Buehl, & Beck, 2015). The demanding and complex nature of teaching at the tertiary level likely enhances the importance of teachers' beliefs for student learning and the classroom environments that these teachers engineer, making research on university and college teachers' beliefs particularly important.

In this paper, I present findings from a small-scale pilot study on higher education teachers' beliefs about knowledge in light of the current knowledge base. Next I present elements of intervention to encourage university-/ college teachers enrolled in educational training programs to reflect on their existing belief systems, and to help teachers to develop beliefs that align more with current educational research.

2 THEORY

2.1 Teacher beliefs

Teachers' beliefs are (pre)conceptions teachers hold that are relevant for their practice (Fives, Barnes, Chiavola, SaizdeLaMora, Oliveros, & Mabrouk-Hattab, 2019). Beliefs usually exist within a system of core and more peripheral beliefs that change through education and experience, with core, or central, beliefs tending to be more resilient and interconnected to other beliefs (Rokeach, 1968). Importantly, the beliefs teachers hold shape their experiences by filtering new information that they choose to pay attention to, framing tasks that they meet in their practice, and guiding behaviours and interpretations of interactions and outcomes (Fives & Buehl, 2016). Teachers' beliefs are often well-developed before they embark on teacher-education, by merit of almost two decades of previous experience with education. Because of such vast experiences, teachers' beliefs are likely to be somewhat entrenched and implicit (Pajares, 1992). While most educational psychology research on teachers' beliefs concerns teachers at primary and secondary levels, some research attention has focused on teachers in higher education (Kane, Sandretto & Heath, 2002). Higher education teachers' beliefs may be particularly important due to the complexities of teaching at the tertiary level, which necessitate teachers' reliance on heuristics rather than evidence-based knowledge (Strømsø & Bråten, 2011). Teachers in higher education are experts in their chosen field, but they are not required to complete formal teacher training, and thus it is unlikely that they are well-acquainted with research on education and learning, nor will they have been invited to reflect on the beliefs that they hold in light of research on teaching and learning (Kane, et al., 2002).

Teacher beliefs research has focused on multiple types of beliefs, from beliefs about students, to self, to motivation, subject-knowledge, and beyond (Fives & Gill, 2015). Also noteworthy is that while teacher beliefs are closely related to teacher knowledge, they are separate in that beliefs are thought to be more affective, episodic in nature and they lack the conditional requirements of truth and justification (Buehl & Beck, 2016). And it seems likely that there are relations between teachers' epistemic beliefs, their teaching and learning beliefs, and practices (Parkinson & Maggioni, 2017; Strømsø & Bråten, 2011), where more advanced views of knowledge as constructed and evolving are likely to align with viewing teaching as interactions to facilitate learning, problem solving and critical thinking, and related practices (Strømsø & Bråten, 2011). On the other hand, teachers may hold separate beliefs about knowledge in terms of teaching contra research (Fives & Buehl, 2008), where the former are not so well-developed (Strømsø & Bråten, 2011).

Studies that have focused on teachers' beliefs in higher education have a shorter history (approx. 30 years) and are sparse in comparison to studies at the primary and secondary level (Kane, et al., 2002). In their 2002 review of teacher beliefs at the tertiary level, Kane and her colleagues identified 50 research papers that addressed university teachers' beliefs about teaching, reporting that studies tend to base their findings on theories-in-action (teaching practice) or espoused beliefs (their reported beliefs), with a distinction often being drawn between "learning facilitation and knowledge transmission" beliefs about teaching (Kane et al., p. 187). That is, teaching as a process to help students develop key skills, such as critical thinking, on the one hand, and teaching viewed more as conveyance of information on the other. In addition, Kane and colleagues identified teacher beliefs articles with a focus on beliefs about aspects other than teaching, including student learning, academic work, lecturing and understanding. Following this study, Strømsø and Bråten (2011) have focused on teachers' beliefs and the role of faculty training programs (for more information see section on epistemic beliefs, below). Fischer and Hänze (2019) also focused on value beliefs and views of teaching and were able to predict students' perceptions of the structure of classes, clarity of instruction and student involvement. Yuan (2017) also explored university-based teacher educators' teaching beliefs and practice in Hong Kong, finding that teacher educators were sometimes stopped from acting in accordance with their beliefs due to extraneous pressures, such as "publish or perish" (p. 259), that may be a familiar scenario for many higher education teachers in combined teaching-research positions.

By and large, however, the issue of teachers' beliefs at the tertiary level has not garnered much research attention from an educational psychology perspective. Thus, basing the discussion on research on primary and secondary teachers, Strømsø and Bråten (2011) conclude it is feasible to assume that, with their roots in personal experience, rather than teacher education, university teachers' beliefs will be implicit and rather robust. The researchers also consider the possibility that teachers' beliefs about teaching (facilitation vs. transmission) may be related to their beliefs about knowledge. For example, that views of teaching as transferral of knowledge may be related to viewing knowledge as an entity that can be passed on, that is certain, rather than tentative, and therefore invokes little need to justify knowledge claims or engage in critical thinking processes. At the same time, Strømsø and Bråten (2011) reason that higher education teachers' beliefs about knowledge may be based on research, rather than teaching, and are therefore likely to be rather well-developed, which may give grounds to believe that there may be a misalignment in faculty's beliefs about knowledge and knowing in their research, contra teaching. This is supported by teacher beliefs researchers that purport teaching knowledge as a separate knowledge domain that includes all knowledge about teaching (rather than the subject that is being taught, Fives and Buehl, 2008). Views of knowledge and knowing are the focus of research on epistemic beliefs, which we describe in the next section.

2.2 Epistemic beliefs

Research on students' epistemic beliefs was initiated by Perry (1970) who, based on longitudinal studies of ethical and intellectual development in young male students, developed a model representing stages of development in terms of views of knowledge and knowing. Research on other student groups ensued, and a general pattern of development concerning epistemic beliefs was established. Kuhn (1999) describes this pattern in terms of realism, absolutism, multiplism and relativism. Here there is a progression from seeing knowledge as a copy of reality, to either-or/ right-or-wrong views, through a period of anything goes, to appreciating the need to weigh and corroborate claims across multiple sources. Development of epistemic beliefs according to these models happens as a result of higher education and experience (Perry, 1970).

Progressing from use of qualitative methods such as interviews and scenario-based studies that were time-consuming to execute and analyse, Marlene Schommer (1990) started a movement that viewed students' epistemic beliefs as multi-dimensional (rather than unidimensional) and separate-yet-related. Another notable contribution of Schommer's work was the introduction to paper-and-pencil questionnaires that could easily and swiftly be scored and subjected to quantitative analyses and reliability measures could be calculated. Hofer and Pintrich (1997) summarized research on epistemic beliefs to that time and concluded that epistemic beliefs consisted of beliefs about the nature of knowledge and the nature of knowing. This model of investigation was held in esteem by researchers focusing on students' and teachers' epistemic beliefs, alike. During this era of research there was also a strong focus on relating students' and teachers' epistemic beliefs to learning outcomes in students, with links being established to strategy use, higher order- and critical thinking, reasoning and argumentation, and researchers have identified domain-specific differences in individuals' beliefs about knowledge and knowing, that is between different knowledge domains (Greene, Cartiff & Duke, 2018; Hofer, 2016).

However, dissatisfaction with the reliability and validity of questionnaires, as well as disagreement about the dimensions of epistemic beliefs, and discussions as to whether measures that are designed to capture epistemic beliefs about a given domain can be reliably transferred and used to assess other knowledge domains, as well as an important re-examination of the philosophical and psychological roots of research on epistemic beliefs (Chinn, Buckland & Samarapungavan, 2011; Mason, 2016) has led to further developments in the field of epistemic cognition, with some researchers calling for more focus on beliefs about the justification of knowledge claims (Ferguson, 2015; Ferguson, Bråten, Strømsø, 2012). That is, how individuals judge the validity of knowledge claims, which is how epistemic beliefs are represented in this study. In short, individuals judge the veracity and validity of knowledge claims by appealing to *personal* sources of knowledge such as gut-feeling or logic, *authoritative* knowledge sources, such as textbooks or researchers, and finally, *multiple* sources of knowledge are cross-checked and collaborated (Ferguson, Bråten & Strømsø, 2012).

The methodological developments that have been detailed have also been echoed in research on teachers' beliefs, also (1) mixed methods studies have allowed participants' voices to influence the development of quantitative measures (Fives & Buehl, 2008), (2) more philosophically informed models of teachers' epistemic beliefs have emerged (Buehl & Fives, 2016), where justification beliefs feature

as a central tenet in terms of teachers' own learning and when directing teaching and learning for students, and (3) there has been a move to focus on studying teachers' epistemic beliefs in action, for example, by observing practice (Barnes, Fives, Mabrouk-Hattaba & SaizdeLaMorab, 2020).

Teachers' epistemic beliefs are held to be especially important given the key role of knowledge and knowledge building in education, and by merit of their influences on what sources of knowledge teachers pay attention to, what they learn in teacher education (and can teach), how they teach and assess their students (Bråten & Ferguson, 2015; Buehl & Fives, 2016), as well as the influence of students' epistemic beliefs on their learning (Greene et al., 2018). There is now a focus in the research literature on how teachers' epistemic beliefs interact with contextual constraints to influence teaching practice and students' learning (Buehl & Fives, 2016; Feucht, 2010), as well as how teachers' epistemic beliefs can be changed to enhance practice (Lunn Brownlee, Ferguson & Ryan, 2017; Schraw, Lunn Brownlee, Olafson & Vanderveldt, 2017).

2.3 Changing beliefs

While it is generally held that epistemic beliefs develop gradually through education and experience and follow an approximate trajectory of development (Ferguson, Skibsted Jensen, Andreassen & Bråten, 2020; Perry, 1970), there is also burgeoning research evidence that both long- and short-term interventions can lead to changes in individuals' views of knowledge and knowing (Gill, Ashton & Algina, 2004; Kienhues, Ferguson & Stahl, 2016; Lunn Brownlee et al., 2017; Parkinson & Maggioni, 2017). This has led to studies of targeted and more natural interventions (i.e., teacher education) in teachers' beliefs.

First, targeted interventions have tended to include the introduction of cognitive conflict in (preservice) teachers (Gill et al., 2014), for example, induced by text-based materials that introduce and then demerit commonly held fallacies about teaching knowledge (Gill et al., 2014). This line of investigation mainly draws on the conceptual change tradition, an approach that has been expounded by Bendixen and Rule (2004) and extended to explain change in epistemic beliefs. In short, Bendixen and Rule explain a mechanism of change in terms of the introduction of cognitive doubt surrounding prior beliefs, invoking the experience of dissatisfaction with existing beliefs in tandem with the presence of a will to change beliefs and the means to do so, that is, resolution strategies, and the means to employ them. For example, Gill et al. (2004) changed pre-service teachers' beliefs about teaching and learning through a short (15-min) text-based intervention where participants read a text designed to challenge their pre-existing beliefs. Before reading, participants' attention was directed towards information in the text that conflicted with their pre-existing views. This investigation targeted beliefs about teaching and learning rather than beliefs about knowledge. However, Valanides and Angeli (2005) also noted that students displayed more advanced beliefs about knowledge after a 65-min intervention that included presenting the students with a text representing opposing views on a disputable topic and then having them discuss the content, and reflect on and evaluate their thinking about the issue.

Other researchers have focused on the role of reflection in belief change (Parkinson & Maggioni, 2017), where reflection can be introduced in a targeted manner. For example, Valanides and Angeli's (2005) study included elements of reflection induced by collaborative work and participating in Socratic questioning. Interventional research on other aspects relating to epistemic beliefs (e.g. strategic sourcing; Braasch, Bråten, Strømsø, Anmarkrud & Ferguson, 2013) also suggests that reflection might be achieved by having students engage in group discussions that are based on instructional materials that demonstrate different ways of thinking, such as so-called contrasting cases that explain two fictional thinkers' ways of reasoning about sourcing. Reflection may also be viewed as a more "natural" intervention as part of teacher education. For example, over the course of a semester, Brownlee and colleagues (Brownlee, Petriwskyj, Thorpe, Stacey & Gibson, 2011) had preservice teachers engage in research-based teaching techniques (e.g. collaborative learning) and students engaged in written reflection afterwards. Other methods of inducing reflection include journal writing/ logs or explicitly having the students rate their own views of knowledge (Schraw & Olafson, 2015). Lastly, the idea of reflexivity in changing teachers' beliefs was recently promoted by Lunn Brownlee et al. (2017). Reflexivity, builds on reflection, but is said to be characterised by internal dialogue

that takes place as the learner/ teacher tries to understand and evaluate multiple perspectives (e.g., own, school policies, curriculum) and further “bending back thought upon self” to consider possible implications (Lunn Brownlee et al. 2017, p 247).

3 METHOD AND RESULTS OF PILOT STUDY

3.1 Participants and measures

To investigate these questions further and provide a starting point for interventional research, a small pilot study was designed to investigate higher education teachers’ epistemic beliefs, to see if it was possible to identify patterns of differences in endorsement of different belief dimensions. For the pilot study, participants were 11 faculty staff that were attending a course on teaching in higher education at a higher education institution in S.E. Norway. The participants completed the Internet-Specific Epistemic Justification Inventory (ISEJ; Brandmo, Bråten & Kammerer, 2018). The 12-item Inventory is based on a conceptualization of justification for knowing that includes beliefs concerning personal justification, justification by authority, and justification by multiple sources, which have been shown to be central dimensions of epistemic beliefs (Ferguson et al., 2012). All items target justification beliefs when using the Internet as a source of teaching knowledge (examples follow).

There are four items assessing each dimension of justification beliefs: The items that are meant to assess personal justification concerned evaluation of information found on the Internet based on prior knowledge and reasoning (sample item: When I find information about an educational topic on the Internet, I evaluate whether this information is consistent with my own understanding of the topic). The items that are meant to capture justification by authority focused on evaluation of information on the Internet in light of the expertise of the source (sample item: When I read something about an educational topic on the Internet, I evaluate whether this information is written by an expert). Lastly, the four items to assess justification by multiple sources concerned evaluation of information on the Internet by checking several information sources and comparing across websites (sample item: To evaluate whether information I find on the Internet about an educational topic is reliable, I check whether it is consistent with information on other websites). Participants rated each item on a 10-point anchored scale ranging from strongly disagree (1) to strongly agree (10) (the description of the instrument is adapted from the original validation study by Brandmo et al., 2018, see appendix in that article for all items).

Data collection took place during a compulsory seminar or higher education. 23 faculty were asked to participate and 11 complied. Completion of the 12-item questionnaire took around 10 minutes. The ISEJ has been validated in a previous Norwegian sample (Brandmo et al., 2018), and we rely on the psychometrics reported in that study when analysing the data from this pilot study. The instruction was particularly tailored to address «reading of information on educational topics on the Internet”, which we view as a central source of information today.

3.2 Tentative results

Descriptive data for the three dimensions is provided in Table 1. Given the small sample size, results from this pilot study should be interpreted with caution, and the findings should be replicated in larger populations. Despite the small sample, though, it was still possible to detect significant differences between the participants’ responses to the items pertaining to the different dimensions of justification. That is, paired sample t-tests were used to compare means: personal justification and justification by multiple sources $t = 8.10$, $p \leq .000$; justification by authority and justification by multiple sources $t = 3.45$, $p \leq .005$; and personal justification and justification by authority $t = 2.32$, $p \leq .00591$ (approaching significance).

Table 1. Results of pilot study

Dimension	Personal justification	Justification by authority	Justification by multiple sources
Max. = 10	7.75	7.18	6.15

Given the small-scale nature of this study and the lack of other studies using this measure with teachers at the tertiary level, it is important to contextualize them in the current knowledge base. The finding that higher education teachers tend to rely significantly more on personal sources of knowledge, like own understanding, rather than appealing to the expertise of others or checking with multiple sources of information when evaluating information about education on the internet, align with tentative assumptions made by Strømsø and Bråten (2011). Namely, that the advanced views of knowledge and knowing that teachers in higher education likely hold in their domain of expertise do not transfer to the domain of teaching knowledge. Rather, it seems likely that beliefs in teaching are based on educational experience. The findings align with research that focuses on epistemic beliefs in novice teachers (Ferguson et al., 2020), which may support these tentative suggestions. However, it should be noted that there is otherwise a lack of research literature on teacher beliefs in higher education (Kane et al., 2002) to cushion this finding in. Moreover, the participants were not novice teachers, though they may be viewed as novices in term of familiarity with educational literature.

The remainder of the paper will use these tentative findings and the mixed literature review from teachers at all levels of the education system presented earlier, as a springboard to suggest that teachers in higher education could profit from participating in interventional programs embedded in foundational studies of education that are now widespread in Norway (Ministry of Education and Research 2016-2017). This is done in the knowledge that the empirical base is somewhat of a patchwork, but also with the view that this is a legitimate line of inquiry given the central role of teacher beliefs, and particularly beliefs about knowledge (Buehl & Fives, 2016).

4 DISCUSSION AND SUGGESTIONS FOR INTERVENTION

The finding that higher education teachers hold views of knowledge about teaching that may be similar to those of novice teachers suggests a potential mismatch in teachers' epistemic beliefs regarding research and teaching. Moreover, relations between beliefs about knowledge, teaching and learning might suggest that such beliefs will not support practice that encourages students to engage in knowledge construction or critical thinking (Feucht, 2010; Strømsø & Bråten, 2011), and that the teachers may fail to update their teaching knowledge base. In light of research on higher education teachers, interventions based on primary- and secondary teachers, as well as the tentative findings from this study, I will now present research-based suggestions for consideration in future intervention studies at the tertiary level. Given the current focus on teaching in higher education and requirements for staff to complete compulsory courses in education, it is conceivable that such an intervention might take place within that context. If this is to be done, then it is important to ensure reliable measures of participating teachers' starting points in terms of the epistemic beliefs that they hold. Given the solid psychometric properties of the measure by Brandmo and colleagues (2018), the ISEJ may be a good starting point. This should, however, be supplemented by more qualitative measures of beliefs in action (Schraw & Olafson, 2015).

First, given the central role of epistemic beliefs in students' learning and teachers teaching, it seems important that the topic be raised in educational courses for faculty. Hofer (2000) laments the lack of teaching about epistemic beliefs in educational psychology and teacher education classes, and the researcher has engaged in specific instruction about the topic with students. Higher education teachers need explicit knowledge about what epistemic beliefs are (beliefs about knowledge and knowing) and how they are relevant for teaching and learning. This could be achieved by introducing the research literature and group discussions about how these beliefs present in practice.

Second, it is important that the educators teaching staff in higher education avoid *talking the talk, while failing to walk the walk*. By this, I mean that aspects of epistemic belief research, such as showing how educational research evolves, should be incorporated in classes. This may be done by offering multiple perspectives on teaching and avoiding "prescriptive" recipes (Maggioni & Parkinson, 2017, p. 231), as well as comparing different knowledge claims about teaching. Another method may be having teachers engage in a new form of (evidence-based) teaching/ method and group reflection afterwards (e.g. as part of peer/ colleague supervision; Ferguson & Luimes, 2020). The goal of these activities should be to help higher education teachers to align their well-developed views of knowledge concerning the knowledge domain that they research and their knowledge views about teaching (cf. Strømsø and Bråten, 2011). This might be achieved by helping the teachers to view teaching as a part of their research, rather than an *add-on* of lower status, as well as introducing them to research literature and a systematic approach to developing their views about teaching (cf. Ministry of Education and Research 2016-2017).

Third, guided reflection should be a key aspect of educational courses for higher education teachers, as well as finding ways of relating reflection to practice (Parkinson & Maggioni, 2017). Having staff enrolled in these classes study (contrasting) case studies that make other teachers' actions and (epistemic) thinking explicit (cf. Braasch et al., 2013), and considering their own teaching and assessment in light of their beliefs, may be fruitful (Lunn Brownlee et al., 2017). Interview methods or think aloud studies may also be ways of making teachers' thinking, and views of knowledge, more available for reflection.

As a final note, it is worth mentioning that one off interventions/ programs will not be sufficient to change faculty's beliefs in the long run (Kienhues et al., 2016). Rather, small *drips* of epistemic reflection should be embedded throughout semester- or year-long courses, along with opportunities to test out beliefs in action and gain feedback through peer-supervision.

5 CONCLUSIONS

Despite limitations regarding the small-scale of this study and a lack of "online" behavioural data (Kane et al., 2002) or questions that relate the teachers' epistemic beliefs to views of teaching, it may be seen as a starting point for interested educational researchers.

The increased demands to teaching in higher education provide opportunities for systematic research on teaching by those conducting the courses (as well as for research on own practice by participants). Given the entrenched, and likely implicit nature of teachers' beliefs about knowledge in higher education, as well as a general lack of general pedagogical training in combination with vast educational experience as a student (Kane et al., 2002) and novice-like beliefs about teaching knowledge, it is unlikely that teacher beliefs that are left unaddressed by these courses will change as a result of participation in said course. Rather, a more systematic "intervention" approach may be necessary. Despite the small scale of this study and the patchwork research base, the findings do align with existing research. As stated by McAlpine & Weston: "Fundamental changes to the quality of university teaching ... are unlikely to happen without changes to professors' conceptions of teaching" (in Kane et al., 2002), and to this I would add the need to change the closely intertwined concepts of knowledge (and learning). Therefore, I have outlined evidence-based ideas for helping faculty to address these beliefs in educational classes. My hope is that such interventions could lead to belief change, and greater alignment between university and college teachers' beliefs and practice, as well as between their beliefs and educational research, which may be documented by artefacts such as class assignments and teaching portfolios, as well as pre-post-tests (e.g., ISEJ) to look for signs of change throughout the course (cf. Woolfolk Hoy & Murphy, 2001).

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