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Pedagogical Voyeurism: Dialogic Critique of Documentation and Assessment of Learning

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Abstract

We challenge a common emphasis on documentation and assessment of learning for providing good education: from the mainstream of neoliberal accountability movement to the progressive Reggio Emilia schools. We develop these arguments through discussing: 1) immeasurableness of education and learning, 2) students’ ownership/authorship of education and learning. We ground our conceptualization of educational assessment in critical dialogue, in a case of a student who requested assessment of her research project, and guided her peers and the teacher in providing different aspects of this assessment. We argue that documentation of learning on teacher’s demand leads to surveillance, discipline, distraction, teacher-student distrust, and robbing of students from ownership of their education and thus it is anti-educational.

Keywords: educational assessment, documentation, educational surveillance, kidwatching.
Vigilancia Pedagógica: Crítica Dialógica de la Documentación y la Evaluación del Aprendizaje

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**Resumen**

Retamos el énfasis común puesto en la documentación y la evaluación del aprendizaje para proveer una Buena educación: desde el movimiento dominante de la contabilidad neoliberal a las escuelas de la Reggio Emilia. Desarrollamos esos argumentos mediante la discusión de: 1) Lo inmensurable de la educación y el aprendizaje, 2) la propiedad del alumnado sobre la educación y el aprendizaje. Basamos nuestra conceptualización de evaluación educativa en el diálogo crítico, en el caso de un estudiante que solicitó la evaluación de un proyecto de investigación y guió a sus iguales y a su profesor en proveer diferentes aspectos de esa evaluación. Sostenemos que la documentación del aprendizaje como demanda al profesorado conduce a la vigilancia, la disciplina, la distracción, la desconfianza entre profesorado y estudiantes y a robar al alumnado de la propiedad de su propia educación y, por esto, es anti-intelectual.

**Palabras clave:** evaluación educativa, documentación, vigilancia educativa, vigilancia de niños.
Somehow, little kids learn to speak without somebody following them with the inquiry about "evidence of learning"


Burning Learning Day

I (the first author) had my first professional pedagogical night-dream in three scenes:

Scene 1
I’m a novice at a meeting of the K-12 parents-teachers-students innovative school-cooperative in front of the school on a parkway. Only teachers and parents are present, a rather big crowd. A nearby parent tells a small group that she participates in an online discussion about what is learning with some of her friends. She wishes that “we” (parents and teachers?) also had such an online forum. I propose to have a Facebook page. Many parents and teachers support this idea. Another parent says she wants to discuss “evidence of learning” and “what is learning.” Many other parents and teachers enthusiastically want to join a discussion of these topics.

Scene 2
I’m in a classroom of teenage kids with a few other female parents and a male teacher. I’m schmoozing from one group of kids to another. Suddenly I hear some parents yelling at some kids. I turn around and see a group of teens burning their artwork in the classroom. I can smell smoke of burning paper. A few parents yell at the kids, “Why do you burn your beautiful evidence of learning?! Stop it at once!” The kids reply, “It’s our work, we can do with it what we please!” Parents yell, “You can’t! You mustn’t!” — the parents try to extinguish the fire. The involved teens ran away from the classroom and the school. The parents
follow them. The only adults who remain in the classroom are the teacher and me. I try to comprehend what just happened. The other kids in the classroom mind their own business.

Suddenly with enthusiasm, I come up to the teacher and tell him that what the kids did makes a lot of sense to me. Products of learning must be burned! The teacher does not reply to me — he seems to be still in shock of what happened. I’m leaving the classroom in search of the kids.

**Scene 3**

I found the group of teens, who burned their artwork outside of school, hiding from the parents. I tell them that I understand why they burned their learning products. They ask me with surprise, “You do?!” They say that all learning must be burned. They say that their parents do not understand that. I agree. I promise to talk to the parents and the teachers and explain that to them. I say that maybe “we” (who?!) should establish a Burning Learning Day as a tradition in the school.

I woke up.

I remember that when I graduated from a high school in the Soviet Union, some of my classmates and I burned our school textbooks and our notebooks. In my dream, the students of an apparently innovative school burned the fetish of learning through a carnivalesque celebratory ceremony.

**Introduction**

In this paper, we want to challenge a common current ubiquitous insistence on documentation and assessment of learning as necessary and important for providing good education, coming from diverse corners of the Educational Empire: from the mainstream of neoliberal accountability movement to the progressive Reggio Emilia schools. In both cases, it is the assessment itself that drives and defines the practice of “good pedagogy.” Thus, the former President of the United States George W. Bush announced at the joint session of the Congress his famous educational policy “No Child Left Behind” on February 27, 2001,

Critics of testing contend it distracts from learning. They talk about ‘teaching to the test.’ But let’s put that logic to the test. If you test a child
on basic math and reading skills, and you’re ‘teaching to the test,’ you’re teaching math and reading. And that’s the whole idea.

For a different reason and different aim, progressive education movement also calls for documentation of students’ learning. At presentation on "Playworlds and Exploratory Learning: Preschool Didactics from Inside" at the CUNY Graduate Center, on May 6th, 2014, Anders Jansson, an early childhood education scholar from Sweden, inspired by the Reggio Emilia, announced,

Just being with children is already very gratifying for the teachers, but once the teachers have collected documentation [on what children are doing] and look at children’s learning through this documentation, then it becomes pedagogy.

In the former case, good pedagogy is guided by standardized testing. In the latter case, good pedagogy is guided by learning portfolios – a collection of students’ work and documentation of students’ learning processes – to make learning visible.

[Documentation] allow[s] us to make visible the process of children's learning, the ways to construct knowledge, the emotional and relational aspects; in fact, all the facets that contribute to leave traces of a competent observation. … Through documentation we leave traces that make it possible to share the ways children learn, and through documentation we can preserve the most interesting and advanced moments of teachers' professional growth. It is a process in which teachers generate hypotheses and interpretations of theories that can modify the initial, more general theories [about children’s learning] (Rinaldi, 1998, pp. 120-121).

In both cases, genuine good pedagogy starts with documentation of the students’ learning. In contrast, we think that good pedagogy should start with supporting students’ autodidact learning (Sidorkin, 2009), emerging from the practice itself, unpredictable, surprising, self-correcting and inherently relevant to the participants.

The notion of "documentation" was recently developed by the Reggio Emilia approach to preschool education. In their very extensive writings about "documentation" and later also in the Swedish Reggio-inspired approach to Early Childhood Education -- "documentation" is: photographs and videos of children at work and play, children's narratives and artifacts,
teacher's field notes as they observe children and listen to children. Teachers then use the documentation they collect to further develop extensive learning projects for and with the children. So if they notice that someone is interested in sharks, they will then develop a whole project involving multiple activities: reading about sharks, finding out more about sharks through videos, creating drawings of sharks, making sharks out of different materials, creating play involving sharks, etc. Thus, documentation is used as a pedagogical tool. A child's engagement in painting, storytelling, or just having a good time with the others, is "documented." Looking from a Bakhtinian stand-point, through inscription of children’s life, the teachers become authors of children's lives, and children, from the teacher's point of view are characters in the narrative (environment) they shape for them (Lensmire, 1997; Miyazaki, 2010).

We will consider whether pedagogical documentation of students' learning, activities, projects, achievements, behavior is:

a) "A vital tool for the creation of a reflective and democratic pedagogical practice... [for] the discourse of meaning making... [for] providing the means for pedagogues and others to engage in dialogue and negotiation about pedagogical work" (Dahlberg & Moss, 2005, p. 145);

b) pedagogical voyeurism, surveillance, patronizing, normalizing, subjectification, disrespecting the students' privacy and agency;

c) a bit both; or

d) something else?¹

We argue that documentation of learning on teacher’s demand leads to surveillance, discipline, distraction, and robbing of students from ownership of their education. Although the Reggio/Reggio-inspired and some other “student-centered” progressive pedagogies are open-ended and children may participate in the decision-making processes for their school lives and activities, children are very aware that they are being documented by the adults. In some instances, children may even document themselves for the self-assessment in those schools. However, the documentation process itself is for the most part, initiated by the teachers who claim that documentation makes the students’ learning visible (Giudici, et al., 2001; Kinney & Wharton, 2008). We claim that this process objectivizes and finalizes students, making them into objects rather than subjects and owners of a
pedagogical practice, e.g. in the so called, “kidwatching,” (Owocki & Goodman, 2002), the classroom-based assessment (Serafini, 2010), etc. It disrespects students’ privacy and agency. Finally, it exploits the students’ images as leaners defined by the teachers to manage the relationship with parents, create favorable image of the school, and justify the school existence for the society and taxpayers.

Part I. The Nature of Education and Learning

Education is often viewed instrumentally as a public business. Politicians, educational activists, parents, and even students are often advocates for education by referring to economy, global competition, upward social mobility, employment, national security, social justice, participation in a democratic society, patriotism, social coherence in the society, providing daycare and healthcare for young children, and so on (Labaree, 1997). Although these instrumental functions of education may or may not be legitimate, the public debates of education often neglect the inherent function of education as a basic human need for self-fulfilling, self-actualization, and self-improvement. We define this inherent purpose of education as a pursuit of critical examination of the self, life, society, and world as embedded in a critical dialogue (Plato, 1997). Thus, using the Aristotelian terminology of causes, the final cause of education is education for its own sake. We argue that education, as any practice, has to be defined by its primary, inherent, needs and not by secondary, instrumental, needs (Arendt, 1958).

As a basic human need of self-fulfillment, inherently-defined education is a personal, private business (Matusov & Marjanovic-Shane, 2011). Society does not have rights to define, shape, or dictate it. The role of the society has to be limited to providing a financial opportunities and access to quality education for all people during their lifetime (and guarding against obvious abuses). Nonetheless, the quality of education has to be defined by the students themselves. Inherently-defined education involves not only the transformation of students’ subjectivity, but also the critical examination of this transformation. In other words, defining the quality of education and assessing this quality is a part of education itself – the primary business of the students.
One may object that the non-instrumental inherently-defined education is a luxury that only a few can afford. Meanwhile most people need instrumental education to fulfill their needs. We somewhat agree with this objection. Genuine education needs resources and conditions to be met. Similar to Maslow’s (1943) hierarchy of needs, basic survival needs have to be satisfied first before human needs of self-actualization. Although some people may not wait until their basic survival needs are satisfied and insist on their self-actualization immediately, it may not be a common trend. Nevertheless, the Greek term “school” means “leisure” (Arendt, 1958). The genuine inherently defined non-instrumental education emerged in an Ancient Greek democratic slavery-based polis, where (male) citizens were free from labor, survival, and necessity of basic needs. Numerous and diverse oases of genuine education have always existed for those who had material opportunities for leisure (often for the rich) and to a certain extent smuggled into the everyday lives of everyone, whenever the circumstances of their lives would allow for it, e.g. various hobbies, passionate pursuit of certain practices, or just having time to hang out with friends and “discuss politics.” Currently, our civilization may be at the brink of a new possibility for the genuine education on a large scale, due to the emergent “technological unemployment” when economy reliance on human labor will subside due to automatization, robots, and smart machines (Ford, 2015; Kaku, 2011; Keynes, 1963; Markoff, 2015). The rapidly growing productivity may create again a possibility for leisure-based society and leisure-based education. The current oases and islands of genuine education may start growing to become available for all.

Conventional instrumental education often defines educational practice as a production of well-defined learning in each student. Societal curricular goals are carefully set (Dewey, 1956), educational curricular standards are defined (e.g., The Common Core in the US), and teaching objectives and assessment are established through lesson plans (e.g., “By the end of lesson, students will be able to do… and know…”). Here learning process is viewed as bounded in time (i.e., lesson, class term, school term) and place (i.e., classroom, school). What is not well known is whether learning occurred or not. This uncertainty calls for learning assessment to see how successful was teacher’s guidance causing students’ learning.
Studying informal and formal learning outside of modern schooling, Lave has discovered that non-school learning seems to be upside-down (Lave, 1992, April). Learning always occurs in any activity, however it remains uncertain what is learned. Non-school learning is a future oriented and future-evolving process, not bounded by time and place. The participants’ experiences in the activity keep evolving in the participants’ new future experiences. Learning, initiated in the past, keeps evolving in the future and, thus, keeps redefining itself through encountering new activities and experiences and through reflection arising from these encounters.

There is no reason to believe that school learning is different from non-school learning, rather conventional normative view of learning may be wrong. Thus, Lave claims that “learning assessment” is a special parasitic practice in itself that conventional schooling creates for non-educational needs. Conventional “learning assessment” is a special practice in itself because it involves students’ recognition and production of the patterns of actions and discourse that are desired by the testing agency and/or the teacher – the proxy of the society (Lemke, 1990). It is parasitic because it usually aims at non-educational goals like sorting students for social mobility (see Sorokin, 1959, who was an advocate of this goal of education), forcing students to do assignments imposed on them, and creating credentials “to increase the exchange value of learning independently of its use value” (Lave & Wenger, 1991, p. 112).

Genuine learning cannot and should not be the purpose of guiding efforts. Learning is an ephemeral future-oriented by-product of activities. When targeted, learning becomes distorted. In targeted learning, people often learn their alienation from the practice, in which the targeted learning is embedded. Targeting learning shifts the focus of the participants from the activity itself: from the logic of the activity, its meaning, its value, its success, judged by the activity participants and especially by the novice; to the focus on teacher’s approval. Often a student worries more about the “evidence of his/her learning” desired by the teacher and test – how to get good grade and to get approval of the student’s action from the teacher – rather than about the activity itself. For instance, Gee, found that even 80% of the honor students could correctly answer SAT questions relating to a paragraph of a literary text, even without seeing this paragraph or knowing what novel or story it is from, but basing their answers only on good guesses
about the test makers’ intentions and values (Gee, 1997). In our view, a student’s success on a standardized test suggests the student’s surrender of his/her own authorial agency in the name of compliance and conformity to the test designers’ preset curricular endpoints. Bakhtin (1986) argued that understanding is infinite and bottomless. When test designers preset the correct answers or performance in advance, they oppress students by turning them in the successful test takers, “A thought that, like a fish in an aquarium, knocks against the bottom and the sides and cannot swim farther or deeper. Dogmatic thoughts” (Bakhtin, 1986, p. 162). Thus, the practice of standardized testing with preset curricular endpoints is anti-educational.

But even to view education as non-schoolish learning is problematic. Education should not be reduced to learning because education can happen without learning. To consider this issue, first of all we have to define education and learning. Elsewhere, we, the first two authors, defined three major approaches to education and learning (Matusov & Marjanovic-Shane, 2012). We called the first approach “alienated learning.” It defines education as learning discrete, well-defined, self-contained sets of knowledge, skills, attitudes pre-established by the society. “Good” learning is seen as the product of education. In this conventional approach, education and “good” learning are equated. We call second major innovative approach “socialization in a socially desired practice.” This approach defines education as socialization into a practice. Learning is defined here as transformation of a novice’s participation and social relations in a community of practice (Lave & Wenger, 1991). Learning is an unpredictable (or not fully predictable) by-product of participation in practices. However, we argue that socialization into a practice may be achieved not only through learning but also through transformation of the practice itself. Thus, for example, blind people got access to the practice of reading not through learning to read the conventional texts but through invention of a new practice of writing and reading invented by Louis Braille in 1824. Political struggle of people with disabilities has transformed public transportation to allow people in wheelchairs to access public transportation without learning how to jump on old buses. Learning is one of many possible pathways of socialization, involving technical innovation, political struggle, social networking, and so on.
Finally, we defined third innovative approach to learning as critical dialogic examination, which we equate here with non-instrumental inherently defined education. In critical dialogic examination, people are engaged in developing their own authorial judgments, opinions, worldviews, attitudes, and perceptions and testing them in critical dialogue with other alternative judgments, opinions, experiences, and so on – what Bakhtin (1991) called “internally persuasive discourse”. In this approach, learning is viewed as authorial, agentive, creative, and dialogic: as transcendence of the personal, social, and/or cultural given recognized by the self and/or others. However, for learning to become education, it has to be embedded in a never-ending critical dialogue with others: other people, other experiences, other values, other worldviews and so on. Can education happen without learning in this approach? Yes, when, for example, critical dialogue deepens own position without necessarily transcending it. Thus, like in the second approach, learning is not a goal of education but rather it is an emerging unpredictable by-product unbounded by time and place.

In sum, our discussion of the nature of education and learning problematizes the need of learning assessment because learning does not define genuine education. Education is a personal, private business and not a social endeavor. Even more, the issue of quality and success of education belongs to the educational practice itself. Now we will turn to the issue of whether learning can be measurable and if documentation of learning is necessary and desirable for the educational practice.

**Part II. Is Learning Measurable? Is Documentation of Learning Necessary and Desirable for Education?**

Our answer is “No,” learning is immeasurable because it is a future-oriented and future-defined authorial subjective process. Positivistic measurement of learning involves development of the definition of learning and the unit of its measurement _before_ observation and judgment of a particular experience. For example, conventional standardized tests define the correct answers regardless of the student’s past and emerging experiences. They view learning as a transition from the student’s wrong to the correct answers caused by the instruction (and self-studies), so-called “learning gains.” However, Bakhtin (1986) argues that meaning is rooted in the relationship between genuine information-seeking question and serious answer and not in
statements that people produce. Thus, meaning-making is dialogic, relational, and bottomless process (Bakhtin, 1986). For example, let’s consider a case of the first grade boy who constantly turns to his peer, a girl, for answer to his math problems like “4+1=” (Matusov, 2009). The girl systematically produces the correct conventional answers. However, when an adult visitor challenges her to consider if “2+2” is always four for any objects, the situation abruptly changed. Initially, the girl claimed that it does not matter what to add: lines or her pencils that she draws to represent 2+2, Russian pencils, or imaginary Martian pencils. Her understanding of arithmetic addition corresponds to the conventional view. However, when the visitor asks what is 200 plus 200, the girl remembers that her mom said 300. Meanwhile, the boy says that it is 400 because it does not matter what to add: pencils or hundreds. The girl protests that a hundred consists of many “lines” difficult to count. So, based on the conventional positivistic measurement of learning, the boy had “learning gains,” while the girl showed “learning regression.” However, after some more reflection and discussion, the visitor realized that the girl might be right to reject the idea that it does not matter what to add. For example, two friends and two friends is not necessary four friends – even more, the answer is unpredictable (it can be zero friends, 2 friends, 3 friends or 4 friends) and unstable in time. Not all 2 objects and 2 objects produce four objects. This investigation can be continued. The assessment of the correct answer is in the eye of a beholder – how far and deep the observer wants to investigate the problem. Also, the problem may potentially generate many diverse questions, which lead to many diverse contexts and meanings, such as: why people add numbers, for what objects 2+2 is four and for which is not four, why we should study it here and now, what is the aesthetics of adding numbers and so on. For many diverse answers and investigations, the predefined “correct” answer of positivistic measurement of learning becomes irrelevant and even wrong disregarding people’s goals and thoughtfulness.

Constructivist measurement of learning – measurement that does not pre-exist but emerges in the consideration of the phenomenon – also has its own problems. Like positivistic measurement, it ignores the observer and dialogic and authorial/subjective nature of meaning-making. In the Reggio Emilia pedagogical approach, the teacher attempts to make students’ learning visible through analysis of students’ products accumulated in learning
portfolios. This reflective exercise ignores at least several important aspects. First, the educator ignores creative, subjective, and authorial efforts that he/she adds to the assessment. Another educator may legitimately construct different “learning” and educational values in the student’s work. The creative, subjective, and authorial nature of the constructivist assessment is often invisible for the constructive educators.

Second, the educator essentializes students’ work, forgetting that meaning is always co-constructed. The author (the student) and the audience (the assessing educator) are in a dance together. Forgetting that the teacher is the partner in this dance shows only the child’s “learning”, which is sometimes like inexplicable dancing leaps. Even the very process of documentation of an educational activity changes the evolving meaning of this activity. This can be illustrated by the following event that took place in a Reggio inspired setting. Two 4-year-old children, Scott and Madi (pseudonyms) were dancing to the background tango music during free playtime when a teacher was taking photographs for documentation. Scott and Madi saw the teacher taking pictures when they were dancing and then they saw the photos as they were being placed on the documentation panel. They even participated in the panel making process with the teacher. Interestingly, when the teacher shared the photos with Scott and Madi, they wanted to dance again requesting a different music than tango. The reality captured in the angle of the teacher’s camera seemed to be the teacher’s validation of the students’ practice, which influenced the students’ future practices. Thus, documentation, as a form of essentializing student’s learning, paradoxically changes the meaning and the course of this very practice. This essentializing of the student’s learning may have something to do with what we see as a paradoxical potential of documentation to become another form of normalization and standardization. Namely, it has been noticed that some parents of Reggio/Reggio-inspired schools frequently complain about the lack of their children’s visibility compared to other stellar students in documented artifacts, apparently questioning the teacher’s choices of display panels.

Third, learning is immeasurable because the educator ignores the dialogic nature of the constructivist assessment. In the constructivist assessment, the educator finalizes the student’s work by responding to the pedagogical community and not to the child, thus excluding the child from this dialogue.
It is a shift away from educational practice itself. The educator’s response is above and beyond the child, who is not and often cannot be a partner of pedagogical discourse in which the child is not involved.

Thus, fourth, the constructivist assessment usually does not emerge from the student’s need and from the student’s inquiry as asking the educator for help (in learning), which makes the assessment irrelevant, if not meaningless, for the student.

In the critical dialogic examination approach to education, the educator’s legitimate social evaluation of the student’s actions or products starts with the student’s request to the teacher (and other participants e.g., other students, peers, parents, remote audience) for assessment, evaluation, appreciation, and/or help. This assessment is often not necessary an assessment of learning but an assessment of the student’s action and products for which the student wants to get feedback. It is not always even an assessment (e.g., good or bad) but at times it is a critical analytic evaluation (e.g., what does it mean, where it may go). Art teacher Crowley describes this serious approach to students and evaluation of their work in the following way,

We had visiting artists…, whose practice was fresh. …this is where it gets really interesting, when I can’t stop enthusing about my work to my students and talking to them like peers… Drop the “please, sir, can I go now” or “is it alright, professor, what I’m doing?” “Is this meeting with your approval, Graham?” Students wouldn’t even ask whether I like things or not. They’ll ask me candid questions about “so what you think of that? Do you think that’s better than that?” I’ll give them a damn straight answer; of course I will! But I’ll give them a reason for why that is a better piece of work (Reardon & Mollin, 2009, pp. 125-127).

This social evaluation starts with the educator’s asking about the student’s own subjectivity: how the student sees and evaluates his/her actions and work, what the student likes and dislikes and why and where the student wants to go from there (Schaefer-Simmern, 1948). Then the teacher can provide alternative ideas, approaches, perspectives (including his/her own, if asked) to help the student make his/her mind about future direction of actions. To be truly dialogic, social evaluation has to be voluntary for students who should have the legitimate and recognized right not to participate in the evaluation. Art teacher Armleder described his own
dialogic deeply serious and mutually interested guidance in the following way,

I just don’t know how to teach other than understanding it in terms of working with a group and using ... the energy of the group and the different points of view, to understand more about what you’re doing yourself. So I’m in exactly the same position as the students when I’m working with them, because I’m discovering things as much as they are. And, as a matter of fact, I take much more out of it, because there are more of them than me.... I don’t believe at all in any kind of power relationship in any situation, and certainly not in art, so I never consider myself as knowing more than students do. I just know it differently, because I have a practice and have shown as an artist. And most of them have not as yet.

[So can you teach art?] Well, I don’t know if it’s teaching... I’m involved as much for myself, as I am for them in trying to understand what we’re doing. So my involvement with the students is more experimental, much more like a laboratory where people get together to understand a bit more about what they’re doing, and what they want to do. Of course, because of my long-time practice I have some kind of knowledge. And because I’m someone who’s been interested in art for a long time, I do have that kind of knowledge, not as an art historian, but as an artist, which, in a way, I’m very happy to share. Because if you give something out like that, it will be assessed critically by the people who are listening to you, and given back to you in a different way. So it’s reviewing from both sides. And because most of the students are people who are just trying to find out if they want to do art or no, and I’m a person who has been doing art for a long time and takes for granted that’s what his life is about, but who still doesn’t know why, its’ a discussion (Reardon & Mollin, 2009, pp. 27-28).

The meaning of the teacher’s guidance is always in a dialogic response to the student – how useful the student finds it for him/herself. Also, of course, the teacher can make private evaluations of the student’s actions and contributions as dialogic understanding of another person, but these private evaluations have to remain private in the dialogic flow of their being together. The teacher’s evaluation is dialogic finalizing aiming at a dialogic provocation of the student to develop new inquiries, test ideas, find new
approaches and perceptions as needed by the student. Dialogic evaluation is a part of dialogic interaddressivity – a genuine human interest in each other (Matusov, 2011).

Part III. Dialogic Authorial Educational Assessment Initiated and Owned by Students

Recently I (the second author) experienced one of my students take a leading role in soliciting the assessment of her main learning project from her classmates and the instructor. This event happened in a combined graduate-undergraduate course on “School – Family relationships.” I ran this course with an Opening Syllabus Education approach, in which the students were progressively engaged in making democratic decisions about different components of the course initially designed by me.

In a mid-term Town Hall meeting, the class decided to abolish summative assessment (grades) for their Main Learning Projects (MLP), but to preserve formative assessment in the form of meaningful feedback on their work in progress – both by their peers and by the instructor (me).

When we made this decision, Maureen, a graduate student, decided to organize her MLP as an experiment involving everyone in our class. Maureen was intrigued by a real event, in which she participated as a parent of a student: a Town Hall meeting in an urban neighborhood held to decide the fate of a traditional public school – to keep it public or to transform it into a charter run by a big private company. The result of the Town Hall meeting was to keep the school public. However, people voted according to the roles: administration for charter while parents against. Maureen wanted to explore an intriguing question, “whether the role of the participants or the issue drives the outcome of controversial situations” (Maureen, MLP, 2015).

Maureen created an activity for our class: a simulation of this neighborhood meeting. We played the roles of the actual parents, teachers, school administrators, neighborhood representatives, board of education representatives, and people from a big charter school company. None of us in the class were familiar with the actual event and our roles were chosen randomly: we drew cards out of a hat, each with a role and its short description. Playing our roles, we improvised a debate about transforming this public school into a charter school. The improvised debate and its outcomes surprised not only Maureen but also almost all of us – our vote
was unanimous to keep the school traditionally public and not charter, regardless of our roles! Even those who played the board of education and the charter school agency representatives surprisingly voted to keep the school traditionally public! It turned out, however, that the seemingly unanimous vote might happen for different reasons, and we were not sure what to make out of them. Some students could not accept their role but voted from their prior true beliefs but some people voted in role regardless of their beliefs (even though they may believe that charter school might be better). Maureen initially concluded that her initial hypothesis of people voting according to their roles was wrong and she asked us what we thought about her conclusion.

However, other students came to different interpretative possibilities. Some students noticed arbitrary nature of the outcome: it just happened that all students who did not accept their simulated roles had roles of pro-charter while those who did accept the simulated roles were pro-public. Some students raised a possibility that if this simulation were done by the business or law students, or just by more politically conservative students, the outcome could have been different. Maureen’s experiment provoked a lot of questions: can the result of the simulation be accepted when the participants understood their roles differently; what were the reasons for each one of us to say what we said and to vote the way we voted; was our final vote a result of our “real” positions or the assumed positions of the “roles” we played; can the two be separated; etc. We discussed that most of us shared similarly liberal political orientations. We also discussed Maureen’s research methodology (e.g., to use a simulation to study what could happen in a real debate). Maureen was authentically interested in our views.

In this whole educational event, it was Maureen, the student, who initiated and owned different aspects of her learning process, including the assessment – which she made herself and solicited on different levels and which she received as a feedback in the whole class discussion of her experiment. In the MLP paper she wrote for the course, Maureen described this experiment and the discussion we had after it in the class, and discussed different dilemmas that the class opened for her. Thus, the educational assessment became an organic part of her research project. Her learning was inseparable from the activity itself. She owned her assessment and guided us how we could help her. The assessment itself had a form of a reflective
critical dialogue – “an internally persuasive discourse” – where truth is tested and remain forever testable (Bakhtin, 1991; Matusov & von Duyke, 2010; Morson, 2004).

However, a student may not always want evaluation of his or her work from a teacher even when the student may ask a teacher for a snapshot of his/her activity. For example, a staff and founder of a democratic school describes these occurrences:

… it's a common occurrence, perhaps weekly, sometimes more often. A child comes to me and says "Jim, will you take a picture of...". It might be a block structure in the playroom, or a dress-up clothes creation. It could be a fort outdoors after two days' work. Sometimes it's performance art: a few weeks ago four girls doing back bridges in a line, after much practice and many attempts to align and synchronize, while a younger child crawled through their human tunnel. It's usually something fleeting -- only occasionally a painting or drawing...

They aren't looking for praise. Sometimes I don't say a word; I just get my camera and silently photograph the scene. I think my silence reflects my own desire not to break the dynamic of their group -- often serious but palpably joyful in proportion to the magnitude of the achievement, and still constrained by whatever unspoken rules govern the creative play.

The interesting part is that whatever purpose is served is complete when the picture is captured. After that it's forgotten. They almost never come to me later asking to see the picture or asking what I'm going to do with it.

I think one of the most important things we staff adults do is to witness children's actions, accomplishments, and growth. Our witnessing seems to validate, honor, make real, or complete the moment.

I wonder if our witnessing also enacts for them their own "outside perspective" -- their own growing ability to see themselves as though through the eyes of another. Doing so may boost their transformation of subjective, immersive, immediate experience to objective, assimilated insight or capacity, available for later examination as mental object, or exercise as mental process. Is this on the path to verbalized or intellectualized critical examination?
I share [...] discomfort with adult authoring "on behalf of" children. I think such efforts miss what's more thrilling to children. Pardon my language, but at a deeper level they don't give a shit about sharks. It's the fin and the fear, or the imagined life underwater, or the association with a family fishing trip, or playing with a new cognitive capacity, perhaps for understanding systems, or any of a multitude of possibilities that are almost always impossibly beyond observation….

Maybe the camera and my picture-taking habit serves only to advertise my "witnessing service". It's an excuse or reason for them to come get me. Saying to me "Come watch me, Jim" might feel (to them) too childish or too much like a child's request of their own parent, but if they are helping me in my mission to get good pictures for publications and ads, well then there needn't be any self-consciousness or childish feeling about asking me…. I like … the word "celebrate" into the mix; feels like a good fit. I think ceremony and celebration are in our blood and bones, deep and primal. Maybe what's happening in my picture-taking is less validation and more imprinting a moment in children's individual and cultural lifelines; recording a new insight or way of seeing or doing.

Maybe the primal tendency for ceremony itself is about the imprinting of important new modules of thought and culture -- aiding the individual and the group in assimilation, consolidation, and preservation of new faculties or milestone memories.

If so, then the come-take-a-picture ritual might be viewed as a child's version of documentation -- capturing a snapshot in the mind of the individual, and in the mind of the group (i.e., culture), available for future reference just as documentation ought to be. The static image in the camera and the action of making it are just prompts or external ceremonializing of a primal interior act.

When parents celebrate their children's accomplishments by taking pictures, it seems different. That is more commonly initiated by the parent, not the child, and it seems to be serving the parent's purposes first. And the parent is less "external" to the child (and vice versa). Also, in parents taking pictures of their children, I think I sense more approval (necessarily bound to values) and less simple witnessing. Certainly not
Back to the issue of pedagogical voyeurism — to the claim that documentation of students’ learning experiences creates good pedagogy. We think this claim may ring some truth, in a sense that pedagogy is created by a special judgment about one’s learning experiences. Where the claim gets wrong, in our view, is whose judgment constitutes the pedagogy. We think that it is the student’s/learner’s own judgment and nobody else’s. Paraphrasing writer Aldous Huxley’s famous quote, “Experience is not what happens to a man; it is what a man does with what happens to him,” we can say, “pedagogy is not what happens with the learner; it is what a learner does with what happens to him/her.” However, we doubt that learners need any documentation of their own learning for themselves because learning is a byproduct of their activities and not a self-contained goal.

**Part IV. Why People Get high on Assessment of Learning? Is it a Disorder?**

In conventional education of alienated learning, learning assessment is desired because it provides the basis for an analysis of the quality of educational practices to take a corrective measure when education is unsuccessful. This pedagogical desire is wrong because learning assessment distracts students from exploration of their subjectivity and testing their ideas. In many conventional and some innovative schools, positivist learning assessment directs the students to conform to the preset ideas, statements, and answers regardless how relevant, meaningful, or wrong these preset ideas felt by the students are. The students try to recognize patterns of actions and discourse that may lead them to the “correct” actions and answers (Gee, 1996). When it is successful as defined by the test scores and grades, this type of education can produce people acting as smart machines that can produce desired reliable outputs. This type of “educational” successes may fit industrial and post-industrial knowledge- and skills-based economy and society. In the words of Sugata Mitra (2013),

0:28 I tried to look at where did the kind of learning we do in schools, where did it come from? … It came from about 300 years ago, and it came from the last and the biggest of the empires on this planet. ["The
Imagine trying to run ... the entire planet, without computers, without telephones, with data handwritten on pieces of paper, and traveling by ships. But the Victorians actually did it. ... They created a global computer made up of people. It's still with us today. It's called the bureaucratic administrative machine. In order to have that machine running, you need lots and lots of people. They made another machine to produce those people: the school. The schools would produce the people who would then become parts of the bureaucratic administrative machine. They must be identical to each other. They must know three things: They must have good handwriting, because the data is handwritten; they must be able to read; and they must be able to do multiplication, division, addition and subtraction in their head. They must be so identical that you could pick one up from New Zealand and ship them to Canada and he would be instantly functional. The Victorians were great engineers. They engineered a system that was so robust that it's still with us today, continuously producing identical people for a machine that no longer exists. The empire is gone, so what are we doing with that design that produces these identical people, and what are we going to do next if we ever are going to do anything else with it? (Mitra, 2013).

Shaping people into smart machine is not humane, even if it is functional and useful for economy. It robs people from self-fulfillment, self-actualization, and making their life meaningful. Besides, there are growing signs that the economy has been undergoing a transformation to become post-knowledge, post-skills agency-based (Zhao, 2012).

In progressive innovative education of socialization in targeted practices, constructivist learning assessment is desired because it guides the progressive educator to design future educational activities that are sensitive and exploitive of the students’ interests and to communicate students’ learning achievements to outsiders and the students themselves. In our view, from education as dialogic critical examination point of view, this pedagogical desire is also wrong because students remain being objects of teachers’ pedagogical actions. However carefully Reggio Emilia educators want to listen to their students, their goal of learning assessment is to monologically finalize the students’ subjectivity to communicate to themselves, other educators, parents and even students themselves about
their learning achievements as the teachers understand and define these achievements. The students are expected to produce learning and the goal of the teachers to notice and explicit this learning in the students’ work, actions, communication, and relationships through documenting learning into learning portfolios. By constant explicating learning, the progressive teachers put their students into a position of “learning machines,” hijacking the students’ own desires, subjectivities, goals, relationships, and so on, for the primary purpose of learning. The by-productive nature of learning is lost here. Instead of looking at learning as a by-product of engaging in meaningful activities and placing the main focus on these meaningful activities, learning again becomes the main focus of the teachers’ pedagogical activity. Again education is equated with learning. The relationship between the teachers and the students is turned upside down. Instead of serving their students when and how the students need them in their own meaningful activities, the teachers view students as producers of learning, learning that is seen, recognized and designed by the teachers, to justify the teachers’ existence, employment, and educational professionalism (i.e., they are not merely babysitters!).

We conclude that a pedagogical desire for a public normative learning assessment – whatever form this learning assessment may take – is anti-educational. It equates education with learning. It distracts the students from their education – dialogic critical examination of the self, life, world and society. It disrespects and violates students’ authorial and subjective meaning making process and their educational privacy. It makes students objects of the teachers’ pedagogical actions justifying the quality of the teachers’ pedagogical work. This is why in our judgment, any pedagogical desire for a public normative learning assessment, whether positivistic or constructivist, is voyeuristic.

Notes
1 At the same time, the Reggio educators also emphasize an image of a teacher as researcher. In this paper, we do not consider issues of pedagogical research, where research and not on-going pedagogy is prioritized.
2 We define leisure as a realized opportunity for self-fulfillment, self-actualization, development and pursuit of one’s own interests supported by the culture and society,
in contrast to idleness, vanity, pure self-entertainment (as a way of killing time), and so on. Not all people who have material means or interest for such leisure.

See more on the Open and Opening Syllabus class regimes at The Open Syllabus Education and Research website: http://diaped.soe.udel.edu/OSER/

Maureen O’Hara asked that her name be used in full.

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Peers Influence Mathematics Strategy Use in Early Elementary School

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Peers Influence Mathematics Strategy Use in Early Elementary School

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Abstract

This study examined the impact of performance goals on arithmetic strategy use, and how same-sex peer groups contributed to the selection of strategies used by first-graders. It was hypothesized that gender differences in strategy use are a function of performance goals and the influence of same-sex peers. Using a sample of 75 first grade students, data were collected at three time-points throughout the school year. Hierarchical linear regression and repeated measures ANCOVAs indicated that performance goals predicted an increased use of retrieval and cognitive strategies, but only in boys. Accuracy in performance and an increased use of retrieval and cognitive strategies were found in all-boy groups, but not in all-girl groups. The study identifies performance goals and peers as playing a persuasive role in the use of retrieval and cognitive strategies for boys. Neither variable explained girls’ preference for manipulative-based strategies.

Keywords: mathematics, strategies, peers, achievement-goals
Los Iguales Influyen en el Uso de Estrategias Matemáticas al Inicio de la Escuela Primaria

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Resumen
El estudio examinó el impacto de los objetivos de rendimiento sobre el uso de estrategias aritméticas, y cómo grupos de iguales del mismo género contribuyeron a la selección de estrategias utilizadas por estudiantes de primer curso. Se hipotetizó que las diferencias de género en el uso de estrategias son una función lo de los objetivos de rendimiento y la influencia de iguales del mismo sexo. Utilizando una muestra de 75 estudiantes de primer grado, los datos se recogieron en tres momentos a lo largo del curso escolar. Regresión lineal jerárquica y medidas repetidas de ANCOVAs indicaron que los objetivos de rendimiento predijeron un mayor uso de estrategias de recuperación y cognitivas, pero solo en chicos. La precisión en el rendimiento y un mayor uso de estrategias de recuperación y cognitivas se encontraron en todos los grupos de chicos, pero no en todos los grupos de chicas. El estudio identifica los objetivos de rendimiento y los iguales jugando un papel persuasivo en el uso de estrategias de recuperación y cognitivas en los chicos. Ninguna de las variables explicó la preferencia de las chicas por estrategias basadas en la manipulación.

Palabras clave: matemáticas, estrategias, iguales, objetivos de logro

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Students typically possess and use a range of strategies for solving mathematics problems (Siegler & Jenkins, 1989). The development of these strategies follows an overlapping wave pattern so that at any time a student has access to multiple strategies and the use of these strategies changes as students discover and adopt increasingly complex strategies (Siegler, 1996; Svenson & Sjöberg, 1983). While the acquisition and use of some strategies is linked to increasingly complex conceptual knowledge (e.g., Baroody & Tiilikainen, 2003) and children’s experiences with strategies influence strategy acquisition and selection, there is growing evidence that contextual factors influence strategy acquisition and selection.

Research has focused on the cognitive underpinnings of strategy acquisition and selection. Students acquire new strategies through a combination of associative and metacognitive processes with associative, automated processes operating when the task is familiar and metacognitive processes being activated when problems occur in strategy use or when children recognize more efficient strategies (Crowley, Shrager, & Siegler, 1997). Siegler and Shipley (1995) proposed that students routinely select strategies as a function of their perceived accuracy and efficiency. Other researchers have focused on the role of conceptual knowledge in the development of new strategies (e.g., Baroody, Tiilikainen, & Tai, 2006; Canobi, Reeve, & Pattison, 1998; Steffe, Cobb, & von Glaserfeld, 1988).

There is some variability in the selection of strategies that is not linked to students’ conceptual knowledge or their experiences with strategies. Some students, labeled perfectionists, use retrieval less because they need to be certain they know an answer whereas “good” students use retrieval more often while being equally accurate (Siegler, 1988). Other research indicates gender differences in strategy use with girls preferring to use counting strategies that require manipulatives and boys preferring to use retrieval and cognitive strategies (Carr & Jessup, 1997). Gender differences favoring more conservative strategies in girls have been found for division strategies, as well (Hickendorff, van Putten, Verhelst, & Heiser, 2010).

It is unclear what produces this variability but one possibility may be the messages students receive from others regarding the value of certain strategies or the importance of speed versus accuracy in problem solving. This research examined the influence of same-sex peers on strategy
selection, specifically, how they support the use of certain strategies. Additionally, we studied whether performance goals supported the use of cognitive and retrieval strategy use and whether performance goals had a negative relationship with strategies utilizing manipulatives.

**Contextual Effects on Strategy Use**

Social context and cultural norms influence strategy acquisition and use (Ellis, 1997), as evident in the types of strategies that emerge when children are calculating prices during street vending in contrast to the strategies they learn in a formal school setting (Nunes, Schliemann, & Carraher, 1993). Within schools, mathematics instructional programs determine the types of strategies being taught. In the United States, teachers typically encourage students to utilize manipulatives, such as counting on fingers or other countable objects, before transitioning to mental counting and retrieval (Sarama & Clements, 2009). In countries, such as the Netherlands, more emphasis is placed on cognitive manipulation of tens and ones (e.g., Beishuizen, Van Putten, & Van Mulken, 1997). Children tend to adopt the strategies supported by teachers and parents.

Cobb and his colleagues (Cobb, Gresalfi, & Hodge, 2009; Cobb & Yackel, 1996) argue that learning mathematics is influenced by socio-mathematical norms and that students shape these norms through their interactions with each other and the teacher. Normative identities and personal identities are argued to emerge within mathematics classrooms (Cobb, Gresalfi & Hodge, 2009). Normative identities reflect mathematics norms and the requisites needed to meet those conventions. Personal identities reflect students’ self-assessments in light of normative identities. Normative identities, and the values of the classroom, constantly change through student-teacher interactions in the classroom. It is through this process that students learn which strategies are valued and develop their identities as mathematics students. Within western cultures, students learn that fast and accurate strategies are valued (Ellis, 1997). As such, when students learn different strategies they learn more than procedures; they learn which strategies are considered signal high or low ability.

Although Cobb argues that normative identities are at the classroom level, gender differences in strategy use may indicate that children construct different norms with girls constructing personal and normative identities that
support manipulative strategy use. Boys, in contrast, appear to construct identities that support a move to faster and more advanced strategies, including cognitive strategies and retrieval. There is no evidence that teachers instruct girls and boys to use different strategies. In fact, teachers appear to make efforts to decrease gender differences in strategy use by encouraging girls to use retrieval and boys to use manipulatives when necessary (Carr et al., 1999). It is unlikely that these gender differences are a function of direct instruction of strategies. Another possible source of these differences would be the achievement goals, particularly performance goals that evolve as students learn more about what it means to do mathematics. We hypothesized that boys, in particular, would become more focused on performance goals and that this would predict their adoption of retrieval and cognitive strategy use.

**Achievement Goals and Strategy Use**

Students with performance goals are concerned about looking smart whereas students with mastery goals are interested in acquiring knowledge and skill (Elliott & Dweck, 1988). Performance goals were linked to seeking evidence of high ability and was found to produce shallow processing and poor learning (Dweck & Elliott, 1983). Recently, it has become evident that performance-approach goals, which involve students seeking to show high ability, and mastery goals can occur together and have positive outcomes for self-efficacy and risk-taking (Pintrich, 2000).

Little is known about the achievement goals of elementary school age children or how these goals influence mathematics achievement. What little research has been done suggests that elementary school children tend to hold mastery orientation (e.g., Stipek & Mac Iver, 1989), but there is some evidence that elementary school age children possess performance goals. Bong (2009) found that early elementary school age Korean children reported both mastery goals and performance-approach goals. Furthermore it was the performance-approach goals that were correlated with mathematics achievement (Bong, 2009). A study by Mägi, Lerkkanen, Poikkeus, Rasku-Puttonen, and Kidas (2010) found performance avoidance to be negatively related to mathematics performance in second and third grade students, but neither mastery goals or performance approach goals predicted performance. In another study, Newman and Schwager (1995)
examined how orienting third and sixth grade students towards mastery or performance goals affected their help-seeking behavior. They found that students in the sixth grade, but not third grade, who were given a performance goal showed less interest than students given a mastery goal in getting help to solve a problem. These studies suggest that performance goals can emerge in early elementary school and appear to have an impact on elementary school students’ mathematics performance when they do emerge. How and when they emerge may be a function of context. In the case of the Korean children, Bong (2009) reported that the school system places emphasis on proving ability so performance-approach goals would be expected.

Performance goals are socially constructed; students learn what is evidence of high or low ability from other students and their teachers (Ames, 1992; Carr et al., 1999; Meece, Anderman, & Anderman, 2006). The group work common in today’s classrooms has been found to focus students’ attention on ability as the cause of outcomes (Ames, 1984), particularly when competition is involved (e.g., Butler & Kedar, 1990). Achievement goals as they develop at the classroom level likely affect the normative identities of mathematics classrooms whereas goals that develop on the individual level likely affect the personal identities of students as mathematicians. In this study we examined goals on the individual level and how these goals affected and were affected by emerging gender differences in strategy use. We examined whether goals predicted change in strategy use or whether changes in strategy use occurred prior to change in goals. We also examined how goals influenced how children reacted while solving problems in same-sex groups.

**Gender and Strategy Use**

Gender differences in mathematics strategies emerge in the first and second grades with boys using retrieval and cognitive strategies and girls using manipulatives (Carr & Jessup, 1997; Fennema, Carpenter, Jacobs, Franke, & Levi, 1998). These gender differences are not strictly a matter of preference (Davis & Carr, 2001). Gender differences have also been found in the strategies used to solve fraction problems with sixth grade boys being more likely to use cognitive strategies and girls being more likely to use written strategies (Hickendorff et al., 2010). Although Carr and Jessup (1997) found
no gender differences in accuracy, Hickendorff and her colleagues found that boys’ preference for cognitive strategies was not necessarily adaptive because it often produced incorrect solutions.

Several social and motivational factors may push children to use different strategies. Boys tend to be competitive in their play and be motivated by competition in general (Goldstein, 1994; Weinberger & Stein, 2007) and in mathematics (Boekaerts, Seegers, & Vermeer, 1995; Knight & Chao, 1989; Seegers & Boekaerts, 1996). Boys are more likely than girls to take risks (Ridley & Novak, 1983). Middle school age boys are more concerned than girls about looking smart (Anderman & Midgley, 1997; Roeser, Midgley, & Urdan, 1996; Seegers & Boekaerts, 1996) and this seems to drive their preference for cognitive strategies and retrieval (Carr et al., 1999). Although not necessarily more accurate, these strategies have the advantage of being fast and boys may be willing to use these strategies, even though there is a higher chance of failure. This may be particularly true when working in groups where competition and performance goals are highlighted.

It is less clear why girls tend to use manipulatives. Girls tend to play cooperatively and prefer cooperative interactions (Knight & Chao, 1989; Maccoby, 1990), and they are more compliant in the classroom (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006). This may translate into a tendency to use strategies explicitly taught in the classroom. In recent years, the focus in early elementary school mathematics classrooms has been on manipulatives. Alternately, girls may use manipulatives because they view themselves as having lower ability. There is some evidence that elementary school age girls view failure in mathematics as being due to low ability and success as being due to effort, whereas boys view success as an indicator of high ability (Seegers & Boekaerts, 1996). Such attributional patterns may discourage the use of retrieval and cognitive strategies in favor of manipulatives. Given that mathematics ability tends to be viewed as a stable, innate trait, it makes sense that girls would avoid strategies that may highlight low competence.

The Present Study

This study explored whether preference for performance goals over mastery goals supports the shift to retrieval and cognitive strategy use. If the focus
on ability, speed, and looking smart drives the use of these strategies then a shift towards performance goals from mastery goals or initially high performance goals should predict the later use of retrieval and cognitive strategies. Given that boys tend to make this shift faster, this should be especially true for them. However, an alternative hypothesis would be that the emergence of retrieval and cognitive strategies predicts an increase in performance over mastery goals with a more performance goal orientation emerging as these strategies are labeled as indicating high ability. Given that the focus was on gender identities as mathematicians, this study focused on same-sex peers. We used same-sex groupings because gender differences are more likely to be expressed in these settings (Maccoby, 1990). If boys and girls are motivated by gender-specific norms then an increase in the use of retrieval and cognitive strategy use in boys and manipulatives in girls would be expected as students work in same-sex groups. We also examined whether there were gender differences in achievement goals.

This study used a longitudinal design in which children were interviewed individually twice, once at the beginning of the school year and once at the end of the school year. This allowed us to measure change in strategy use and attitudes across the full year. The children were interviewed in groups of three in January so that the impact of beginning of year strategy use and beliefs on group interactions could be assessed as well as the impact of group dynamics on strategy use at the end of the school year. It was decided to assess group interactions in January because this timepoint was equidistant from the two individual assessments allowing several months break between individual sessions and the group sessions.

Method

Participants

Seventy-five first grade students (40 males and 35 females) attending an elementary school in Northeast Georgia were recruited to participate in the study. The students were seen three times during the school year in October, January, and April. All 75 students participated in the October session, but strategy data from two participants (one male and one female) were lost due to a technical malfunction in the camera. Sixty-seven students (35 males)
participated in the group session in January and 68 students (37 males and 31 females) completed the third session in April. Complete data from all three sessions exist for 66 students (36 males). The students who did not complete all three waves had moved from the school and were missing at random. Their strategy scores did not differ significantly from those of their peers. The average age of the students at the beginning of the school year was \( M = 6.4, SD = .88 \). Eighty-eight percent of the sample was White, 12 percent was African-American, five percent was Asian, and five percent was Latino.

**Procedures and Materials**

**Individual interviews in October and April.** In October and April all participating students were interviewed individually in a quiet conference room. The sessions were videotaped to allow for later coding of strategy use and inter-rater reliability. The students were assessed on their strategy use for 14 computation problems (see Appendix A) of which five were missing addend problems, half addition and half subtraction problems. The students also solved six word problems (3 addition, 3 subtraction). Plastic counters were made available for use. After each problem was solved the student was asked how he or she solved that problem. The students used an array of counting strategies. Students’ explanations about their strategy use and observations of strategy use were used to categorize strategy use. Because the focus of this study was on the impact of perceived social desirability and emerging performance goals on strategy use, strategies were categorized into manipulative-based strategies, which were hypothesized to indicate low ability and high effort, and retrieval/cognitive strategies, which were hypothesized to indicate high ability and lower effort. The cognitive and retrieval strategies category included both mental calculation and retrieval because retrieval was too rarely used (on average only five percent of the time) to warrant a separate category. Four categories of strategy use were used in the analyses: percent correct and percent attempted for retrieval/cognitive strategy use and percent correct and percent attempted use of manipulatives. Interrater reliability for this measure was .89.

Following this, the children were assessed on their understanding of what it means to be smart through the use of two interview questions and four
Likert scales. For the two interview questions the children were asked, “If a kid is smart at math how does he (she) do math? Are there ways to do math that you think are not so smart?” In the fall more than 50% of the children stated that the use of manipulatives was evidence that a student was smart whereas 37% indicated that cognitive strategies or retrieval indicated a student was smart. As such, students did not orient toward performance goal responses for these questions. Students’ responses for questions the questions were scored as indicating performance goals if they referred to the use of retrieval or cognitive strategies, indicated that being smart meant not seeking help, that a smart student would find problem solving easy, that not-so-smart students used manipulatives, needed help, or had trouble with difficult items. When children’s responses indicated that smart students (question one) used manipulatives, sought help during problem solving, used effort, or when children responded that not-so-smart students (question two) used retrieval or cognitive strategies, the responses were scored as a mastery goal orientation. Students gave one response per question for a range between zero and two points for the performance and mastery goal categories.

Next, the students were asked four questions designed to further assess performance and mastery goal orientations. They were asked whether it was good to try to retrieve the answer from memory, whether it was good to be the first to answer questions, and whether guessing was acceptable. For this task, students were instructed to put down five stars if the statement was very true, if they thought the statement was not very true, they were to put down fewer stars. They were then given two trial examples, “I like ice cream” and “I like carrots”. Once the child understood the task four statements were presented. For each of the questions scores ranged from zero to five stars.

Students’ scores for the first statement was added to their mastery goal score from the two open questions for a total possible combined score of 3. Students’ scores for the last three statements were added to the performance goal score for a total possible score of 5. Finally, the mastery goal score was subtracted from performance goal score to create a single variable that reflected the relationship between performance orientation and mastery orientation so that a high score reflected a tendency to give performance goal rationales over mastery goal responses. Because high scores reflect a
performance goal orientation over a mastery goal orientation this variable is referred to as performance goals in the analyses and discussion.

**Group interviews in January.** In January, students were split into same-sex groups of three. There were 24 groups total with 13 girl groups (one group with 2 members) and 11 boy groups (one group with 2 members). When possible, the groups were comprised of students from the same class in order to better estimate the role of social relationships within classrooms on strategy use.

The students were told that they would take turns solving addition and subtraction problems and that it was acceptable to talk about what they or the other students were doing. Seven sets of addition and subtraction problems used in the individual session were used with the exception of the missing-addend problems. Because there were only two missing addend problems included in the individual session, three new addition items were created for the group work so that all children did an addition missing addend problem (see Appendix A). Strategy use was assessed through observation and the child’s report of strategy use. Percent correct and attempted for retrieval and cognitive strategies and percent correct and attempted for manipulative-based strategies were computed with a possible range within each category between zero and seven.

**Results**

**Gender Differences in Strategy Use**

We first examined whether there were gender differences in strategy use and performance goals. Means and standard deviations for strategy use as measured in October, January and April and for performance goals as measured in October and April are presented in Table 1.
Table 1

Means and standard deviations for performance goals and strategy use

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<th>Fall</th>
<th>Spring</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance goals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>3.95 (2.75)</td>
<td>4.16 (3.21)</td>
<td>-</td>
</tr>
<tr>
<td>Females</td>
<td>3.93 (2.70)</td>
<td>2.87 (2.60)</td>
<td>-</td>
</tr>
<tr>
<td>% Attempted Ret/Cog</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>.22 (.24)</td>
<td>.36 (.32)</td>
<td>.53 (.29)</td>
</tr>
<tr>
<td>Females</td>
<td>.07 (.15)</td>
<td>.16 (.18)</td>
<td>.23 (.25)</td>
</tr>
<tr>
<td>% Correct Ret/Cog</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>.13 (.16)</td>
<td>.25 (.25)</td>
<td>.23 (.23)</td>
</tr>
<tr>
<td>Females</td>
<td>.05 (.12)</td>
<td>.13 (.15)</td>
<td>.12 (.17)</td>
</tr>
<tr>
<td>% Attempted Manipulatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>.47 (.29)</td>
<td>.43 (.31)</td>
<td>.44 (.29)</td>
</tr>
<tr>
<td>Females</td>
<td>.54 (.32)</td>
<td>.65 (.23)</td>
<td>.73 (.25)</td>
</tr>
<tr>
<td>% Correct Manipulatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>.24 (.22)</td>
<td>.30 (.24)</td>
<td>.25 (.21)</td>
</tr>
<tr>
<td>Females</td>
<td>.36 (.26)</td>
<td>.45 (.23)</td>
<td>.42 (.28)</td>
</tr>
</tbody>
</table>

Repeated measures analyses of variance with percent correct use of retrieval/cognitive strategies comparing change from October to April indicated a gender effect, $F(1,63)=5.92$, $p = .02$, $\eta_p^2=.09$, and a time effect, $F(1,63)= 25.26$, $p <.001$, $\eta_p^2=.29$. A similar pattern was found for percent attempted use of retrieval/cognitive strategies with a time effect, $F(1,63)=19.47$, $p<.001$, $\eta_p^2=.24$, and a gender effect, $F(1,63)=10.89$, $p =.002$, $\eta_p^2=.15$. All students increased the correct and attempted use of these strategies over the first grade, but boys consistently attempted and correctly used these strategies more often. A repeated measures analysis of percent correct use of manipulative-based strategies comparing change from October to April with gender as the independent variable indicated a significant change over time, $F(1,63)=5.11$, $p = .03$, $\eta_p^2=.08$ and a significant gender effect, $F(1,63)=7.28$, $p=.009$, $\eta_p^2=.10$. A repeated measures analysis of attempted use of manipulative-based strategies indicated a significant gender, $F(1,63)=5.08$, $p = .03$, $\eta_p^2=.08$, and gender by time interaction, $F(1,63)=4.09$, $p = .05$, $\eta_p^2=.06$ (see Figure 1).
Whereas, girls tended to attempt and correctly use manipulative-based strategies more than boys, boys seem to decrease attempted use of these strategies across the first grade while girls increased their attempted use of these strategies.

Although boys tended to increase reported performance goals over the school year and girls tended to report a decrease in performance goals, the repeated measure analyses of performance goals with gender as the independent variable indicated no significant differences for time or gender.

**Figure 1.** Percent attempted use of manipulatives

**Changes in Strategy use as a Function of Goals and Gender**

We hypothesized that boys’ preference for retrieval and cognitive strategies was, in part, driven by performance goals. We hypothesized that boys would be more likely to hold performance goals and these goals would drive the
acquisition of retrieval and cognitive strategies. Although boys were not
found to hold performance goals more than girls, these goals still might
differentially affect their use of strategies. In contrast, for girls, a low score
on the performance goal variable indicating more mastery goals was
expected to predict their increased use of manipulatives over the year.

To examine this, a change score was created by subtracting strategy use,
as measured in October, from strategy use as measured in April. The impact
of gender, October performance goals and a gender by performance goals
interaction term on the change scores was assessed in a hierarchical linear
regression. Gender and October performance goals were predictors in the
first model and the gender x performance goals interaction term was tested
in the second model. For easier interpretation the interaction scores,
performance goal, and strategy use scores were changed to z-scores.

**Retrieval and cognitive strategies.** The first model examining predictors of
change in student’s attempted use of retrieval/cognitive strategies with
October performance goals and gender as predictors was significant,
\(F(2,63)=5.28, p=.008, R^2=14.\) Performance goals measured in October, but
not gender, significantly predicted change in attempted use of retrieval and
cognitive strategies, \(\beta=.37, p<.003.\) Model two included the gender by
performance goal interaction term that was significant, \(F(3,62)=5.35,
p=.002, R^2 \text{ change}=.06, p=.03.\) In model two, both October performance
goals, \(\beta=.61, p<.001,\) and the gender by performance goals interaction term,
\(\beta=-.52, p = .03,\) were significant. In interpreting the interaction, for boys for
every one unit change in fall performance goals there is a .61 change in
percent attempted retrieval/cognitive strategies whereas for girls that change
is only .08. For boys, in comparison to girls, percent attempted retrieval and
cognitive strategy use appeared to change as a function of performance
goals.

For correct use of retrieval and cognitive strategies, model one was
significant, \(F(2,63)=4.51, p = .02, R^2=.13.\) In model one, fall performance
goals significantly predicted the change in the correct use of
retrieval/cognitive strategies, \(\beta=.35, p=.007.\) Model two indicated that the
addition of the interaction term produced a significant increase in explained
variance, \(F(3,61)=4.58, p = .006, R^2 \text{ change}=.06, p = .04,\) with both fall
performance goals (\(\beta=.58, p = .001,\) and the interaction, \(\beta= -.51, p=.04,\) being
significant predictors of change in the correct use of retrieval and cognitive strategies. In interpreting the interaction, for each unit change in fall performance goals there is a .58 change in correct retrieval and cognitive strategy use for boys. For females that change is .07. As with percent attempted retrieval and cognitive strategy use, there is more change in percent correct retrieval and cognitive strategy use for males than for females.

Manipulative-based strategies. In examining change in the attempted use of manipulatives, model one was significant, $F(2, 63)=4.45, p = .02, R^2=.12$. In this model, both gender, $\beta=.50, p =.04$, and October performance goals, $\beta= -.25, p = .05$ predicted change in the attempted use of manipulatives. Performance goals were negatively related to this form of strategy use and girls were more likely to attempt the use of manipulatives. Model two, which included the gender x performance goals interaction term, did not indicate a significant change in explained variance as a result of the addition of the interaction term.

In examining changes in correct use of manipulatives from fall to spring, neither model one or model two were significant, $F(2,63)=2.76, p = .07$ and $F(3,62)=1.85, p = .15$, respectively. Correct use of these strategies was not predicted by gender or performance goals.

Influence of Strategy Use and Gender on Performance Goals
We examined the possibility that the development of performance goals in early elementary school might be a function of the changes to strategy use. In theory, children who were earlier adopters of retrieval and cognitive strategies would be labeled as smarter. We explored this possibility by examining whether change in performance goals from October to April was predicted by October strategy use, gender, or a gender by strategy use interaction. None of the regression equations were significant. These results provide little evidence that gender differences in strategy use produces changes in performance goals.

The Impact of Group on Strategy Selection
A second goal of the study was to examine how same-sex grouping influence the strategies that girls and boys use. If strategy use is influenced
by group norms and there are gender specific norms for strategy use then we should see more pronounced use of retrieval and cognitive strategy use in boy groups and the use of more manipulative-based strategies in girl groups in comparison to the individual sessions. Furthermore, gender differences in strategy use should become more pronounced as students solve problems in-group.

**Comparing group to individual strategy use.** If working in groups accentuates boys’ tendencies to use retrieval and cognitive strategies and girls’ tendencies to use manipulatives we should see more pronounced preferred strategy use in January when students are working in-group in comparison to individual strategy use as measured before and after the group work. We ran repeated measures ANCOVAs with gender as the independent variable and October performance goals as the covariate with percent attempted use of retrieval/cognitive strategies and percent attempted of manipulatives as measured in October, January, and April as the dependent variables.

The repeated measures ANCOVA of percent attempted use of retrieval/cognitive strategies indicated a significant quadratic effect for time, $F(1,63)=8.12, p = .006, \eta^2_p=.11$, and a significant linear time by performance goals interaction, $F(1,63)=9.28, p = .003, \eta^2_p=.13$. There was also a significant gender effect with boys being more likely to attempt the use of retrieval/cognitive strategies, $F(1,63)=18.88, p <.001, \eta^2_p=.23$. In examining the influence of performance goals on each of the three time points, performance goals significantly correlated with percent attempted use of retrieval/cognitive strategy use in January, $r=.30, p=.02$, and in April, $r=.42, p=.001$, but not in October.

The repeated measures ANCOVA of percent attempted use of manipulatives indicated a linear time effect with this strategy use increasing over time, $F(1,63)=4.99, p = .03, \eta^2_p=.07$, a significant gender effect with girls using the strategy more than boys, $F(1,63)=9.99, p =.002, \eta^2_p=.14$, a significant linear time by gender interaction, $F(1,63)=4.48, p =.04, \eta^2_p=.07$, and a significant linear time by performance goals interaction, $F(1,63)=4.19, p = .05, \eta^2_p=.06$. The gender by time interaction, displayed in **Figure 2**, indicates that girls’ attempted use of manipulatives increased over the school year whereas boys’ attempted use of manipulatives remained relatively stable. Although there was a slight uptick in the attempted use of
manipulatives in the group session it was not sufficient to produce a quadratic trend. Correlations of performance goals with attempted strategy use at each time point indicated a negative significant correlation in January, \( r = -0.25, p = 0.05 \) and April, \( r = -0.25, p = 0.05 \), but not in October.

![Figure 2. Percent attempted use of manipulatives across 3 timepoints](image)

**Figure 2.** Percent attempted use of manipulatives across 3 timepoints

**Change within sessions.** To examine the impact of peers on strategy use we observed strategy use change within a single session with the children taking turns solving seven problems. We used repeated measure analyses of variance with attempted and correct strategy use as the dependent variable and group gender as the independent variable. Although the main focus was on attempted use of different strategies we also wanted to examine how group interaction may affect the accuracy of the solutions.

The first analysis included percent attempted use of retrieval/cognitive strategies as the dependent variable and group gender as the independent
variable. The results indicated that male groups consistently used these strategies more than female groups, \( F(1, 21) = 8.67, p = .008, \eta_p^2 = .29 \). When the correct use of retrieval and cognitive strategies was examined the group gender differences, \( F(1, 21) = 11.11, p = .003, \eta_p^2 = .35 \), were accompanied by an interaction effect indicating that boys’ percent correct use of these strategies increased over the seven sets \( F(1, 21) = 6.42, p = .02, \eta_p^2 = .23 \) (see Figure 3). These data indicate that repeated efforts to use retrieval and cognitive strategies resulted in improved accuracy over time for boys, but not girls.

![Figure 3. Average correct use of retrieval and cognitive strategies in group](image)

When examining the use of manipulatives, girl groups were more likely to attempt to use these strategies, \( F(2, 21) = 11.65, p = .003, \eta_p^2 = .36 \). In examining the percent correct use of these strategies, girls showed a
consistently higher pattern of the correct use of manipulatives across the sets, $F(1, 21) = 7.41, p = .01$, $\eta^2_p = .26$. These data indicate more stability in the use of manipulatives and little evidence of increased use over time.

**October performance goals and group strategy use.** We examined the impact of performance goals as measured in October on group strategy use in January as a function of gender. Correlational analyses (see Table 2) indicated that for boys, but not girls, performance goals in October were correlated with attempted use of retrieval and cognitive strategies in the group session ($r=.49$). Likewise, October performance goals were negatively correlated with attempted ($r= -.42$) and correct manipulative-based strategy use in groups ($r= -.42$) for boys, but not girls. For girls, performance goals as measured at in October did not predict strategy use in group. These data suggest that the increased use of retrieval for boys is linked to earlier emerging performance goals, and these goals seem to take the form of avoiding the use of manipulatives and attempting to use retrieval and cognitive strategy use.

Table 2

<table>
<thead>
<tr>
<th></th>
<th>Performance Goals Fall</th>
<th>Performance Goals Spring</th>
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<tbody>
<tr>
<td>Percent Attempted Ret/Cog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>.49**</td>
<td>.27</td>
</tr>
<tr>
<td>Females</td>
<td>.10</td>
<td>.18</td>
</tr>
<tr>
<td>Percent Correct Ret/Cog</td>
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</tr>
<tr>
<td>Males</td>
<td>.30</td>
<td>.31</td>
</tr>
<tr>
<td>Females</td>
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<td>.19</td>
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<tr>
<td>Percent Attempted Manipulatives</td>
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</tr>
<tr>
<td>Males</td>
<td>-.42**</td>
<td>-.25</td>
</tr>
<tr>
<td>Females</td>
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<td>-.17</td>
</tr>
<tr>
<td>Percent Correct Manipulatives</td>
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<td></td>
</tr>
<tr>
<td>Males</td>
<td>-.43**</td>
<td>-.19</td>
</tr>
<tr>
<td>Females</td>
<td>.20</td>
<td>.15</td>
</tr>
</tbody>
</table>
Finally, we examined whether strategy use predicted students’ performance goals. Correlation analyses were performed between in-group strategy use as measured in January and students’ performance goals as measured in the April. We found no correlation between group strategy use and April performance goals. These data provide further evidence that it is performance goals that influence the emergence of strategies and not vice versa.

Discussion

This study replicated prior findings of gender differences in strategy use in early elementary school (Carr & Davis, 2001; Carr & Jessup, 1997; Carr, Steiner, Kyser & Biddlecomb, 2008). We found that boys consistently used retrieval and cognitive strategies in comparison to girls who attempted and correctly used manipulative-based strategies more often than boys. The goal of this study was to determine whether performance goals affected the emergence of these gender differences. It also examined the impact of peers and performance goals on strategy use by examining changes in strategy use within a single session.

We extended prior research by showing that boys move to more advanced strategies is influenced by performance goals. Performance goals as measured in October predicted change in the use of retrieval and cognitive strategies use between October and April and predicted the use of these strategies in-group in January for boys. Furthermore, performance goals were negatively related to the use of manipulative-based strategies. This finding is consistent with prior research indicating that performance goals have been linked to mathematics achievement (Eccles & Midgley, 1989). It is also consistent with prior research in which first grade students’ comments about wanting to look smart were correlated with the use of retrieval and cognitive strategy use for both boys and girls (Carr & Jessup, 1997). Our results indicate that performance goals appear to drive change in retrieval and cognitive strategy use in boys, but not girls.

A test of the alternative pattern in which strategy use would predict changes in performance goal orientations was not supported. Strategy use as measured in October did not predict change in achievement goals nor was strategy use as measured in January correlated with April performance goals. It was thought that strategy use might drive changes in performance goals as
peers and teachers interpret the use of retrieval and cognitive strategies as signs of high ability, but the data does not support this.

A second way to examine the impact of gender on the emergence of strategies was to examine problem solving within same-sex groups. Prior research (Carr & Jessup, 1995) indicated that mixed-gender small groups resulted in an increase in the use of retrieval. In this study we assumed that same-sex groups would increase the likelihood of girls’ use of manipulatives and boys’ use of retrieval and cognitive strategies. As predicted boys showed increased use of retrieval and cognitive strategies during the session. In the case of correct retrieval and cognitive strategy use, boys significantly increased the accuracy with which they used retrieval and cognitive strategies over the seven sets of problems. Observations of boys’ behaviors suggested that boys were actively observing each other’s strategy use and trying to meet or exceed the prior boy’s strategy selection. No such interactions were observed in the all girl groups. These data suggest that, at least for boys, these goals encourage the use of more advanced strategies and the increased efforts to use these strategies results in better accuracy. That was not the case for girls.

In addition, when we compared individual strategy use to group strategy use we found a significant jump for boys in the use of retrieval in comparison to individual strategy use. We found, a quadratic pattern in strategy use with a significant upturn in attempted and correct retrieval and cognitive strategy use for boys, but not girls, in the group session in comparison to the individual sessions in October and April. These data are in line with prior research indicating that classroom characteristics, such as group work increased social comparison and a focus on ability (Ames, 1984; Butler & Kedar, 1990). In this case, for boys, group work provides opportunities for social comparison and that appears to drive the shift to retrieval and cognitive strategies. This is not necessarily a problem if boys are relatively accurate because this process may impel boys towards fluency in their arithmetic. However, if boys are not accurate such behavior could result in a pattern of poor problem solving as the children progress through school.

Although performance goals were negatively related to the attempted use of manipulatives this pattern was not specific to girls, so gender differences in these strategies did not appear to be supported by a more mastery goal
orientation. Unfortunately, the results of this study did not provide much insight into girls’ tendency to use manipulatives. If girls tended toward mastery over performance goals we would expect to see a negative correlation between the performance goal variable and the use of manipulatives for girls. That correlation was not evident. Nor was there evidence that problem solving in same-sex groups of girls would result in an increase in manipulative-based strategies during the session. We cannot conclude that girls feel peer pressure to use these strategies.

**Limitations and Future Research**

Cobb (2001) found that teachers create very different contexts and norms for mathematics in their classrooms. One limitation with this study was the somewhat artificial setting in which to observe strategy use. The method allowed us to control for potential confounding variables that might influence strategy use, such as the problems being solved. Although the children who participated were drawn from a variety of first grade classrooms increasing the generalizability of the data, future research needs to examine how gender differences in strategy use are moderated by classroom level effects. Qualitative observations of children’s interactions in regular classrooms would support the validity of our findings.

Although the children in this study were enrolled in schools that had about 50% free or reduced lunch the sample was not very racially diverse, nor did we compare the strategy use of children of different ability levels or from different socio-economic classes. Low performing children commonly use manipulatives so we may not find gender differences showing boys’ preference for retrieval and cognitive strategies among low performing children. Future research needs to examine whether these gender differences arise across socio-economic groups or whether there are developmental delays as a function of ability level or social class.

The failure to examine changes in strategy use in mixed groups is another limitation. Carr and Jessup (1997) found that boys were more likely to make remarks about competitiveness even in mixed gender groups. The inclusion of mixed gender groups would have allowed us to examine how groups of varying size and gender mixtures would affect the use of retrieval and cognitive strategies in-group. However, it was decided to forgo the use
of mixed gender groups in order to have a large enough sample size of single-gender groups.

In regard to future research, the finding that boys’ accuracy improved during the group sessions as they increased their use of retrieval and cognitive strategies suggests that both boys and girls might benefit from the move to use more advanced strategies when solving mathematics problems, particularly retrieval and cognitive strategies. Research in the area of memory (Roediger & Butler, 2011) indicates that efforts to retrieve information from memory increases retention and accuracy more so than studying the material. Even attempting to use retrieval and cognitive strategies regardless as to the accuracy of the answer results in improved strategy use and better academic outcomes (Carr & Alexeev, 2011). In our study, efforts to retrieve or cognitively compute an answer produces increasingly accurate responses. Although boys’ use of retrieval and cognitive strategies may initially be socially driven, practice with these strategies may result in improved ability to recall and mentally calculate answers, resulting in better performance for boys in no-choice strategy conditions.

References


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Appendixes

Appendix A

**Individual Session Problems**

1. One friend has 15 stickers, he gives 9 of them to his friend. How many stickers does he have left?

2. Paul has 3 playing cards, Paul gives a card to Bill and a card to Evan. How many cards does Paul have left?

3. Ashley has eight candies. Ashley gives six of them to her friends. How much does she have for herself?

4. Donna has thirteen dolls. She wants six more of them. How many dolls will she have?

5. Shawn loves to read. He has eleven books now. Bob gives him four books. Pat gives him another four books. How many books does he have now?

6. Your teacher has five markers. She buys seven more markers. How many markers does she have now?

**Group Session Problems (new problems)**

11+?= 1515+?=22 5+?=12
Self-regulation of Behavior: Students Versus Other Adults

Jitka Jakesova, Peter Gavora, Jan Kalenda

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Self-regulation of Behavior: Students Versus Other Adults

Jitka Jakesova, Peter Gavora, Jan Kalenda
Tomas Bata University in Zlín

Abstract
The objective of this research is to compare self-regulation of behaviour of two Czech samples. The first one was the representative sample of Czech adults that consisted of 1060 respondents. The second sample was university students and consisted of 1244 respondents. The measuring tool was an adapted Self-Regulation Questionnaire of which two dimensions were used: Goal Orientation and Impulsivity. The findings showed no statistically significant differences between the two samples in either of the dimensions. Goal Orientation scores were higher than Impulsivity scores, which was in line with our assumptions. There were no statistically significant differences in Goal Orientation scores between genders, with the exception of prevalence of females in the student sample. Age appeared to be an important factor that affects scores in Goal Orientation in both samples, while in Impulsivity it only differentiated among the students. The level of education proved to be an important factor that differentiates among those with high and low impulsivity rather than in goal orientation.

Keywords: self-regulation of behaviour, psychometric study, goal-orientation, impulsivity.
Auto-regulación de la Conducta: Estudiantes versus Otros Adultos

Jitka Jakesova, Peter Gavora, Jan Kalenda
Tomas Bata University

Resumen
El objetivo de esta investigación es comparar la autorregulación del comportamiento de dos muestras checas. La primera fue representativa de adultos Checos, de 1060 encuestados y, la segunda, fue de estudiantes universitarios y constaba de 1244 encuestados. La herramienta de medición fue un cuestionario adaptado de Autorregulación del que se utilizaron dos dimensiones: Orientación de Meta e Impulsividad. Los resultados no mostraron diferencias estadísticamente significativas entre las dos muestras en ninguna de las dimensiones. Los resultados de Orientación de Meta fueron mayores que los de Impulsividad, en consonancia con nuestra hipótesis. No hubo diferencias estadísticamente significativas en las puntuaciones en Orientación de Meta entre géneros, con la excepción de prevalencia de estudiantes de sexo femenino en la muestra de estudiantes. La edad apareció como factor importante que afecta las puntuaciones en la Orientación de Meta en ambas muestras, mientras que para la Impulsividad sólo diferenció entre los estudiantes. El nivel de educación resultó ser un factor importante que distingue a personas con alta y baja impulsividad en vez de en orientación de meta.

Palabras clave: autorregulación de la conducta, estudio psicométrico, orientación de logro, impulsividad
Self-regulation is an important personal characteristic which strongly affects one’s actions and behaviour. It is often described as the ability to develop, implement, and maintain planned behaviour in order to achieve personal goals (Brown, Miller, & Lawendowski, 1999). Self-regulation can be seen as the voluntary control of attentional, emotional, and behavioural impulses in the service of personally valued goals and standards (Duckworth & Carlson, 2015). Generally, self-regulation is claimed to be the basic ability of the individual to regulate oneself in relation to the environment and personal goals. In doing this, the individual overcomes the discrepancy between one’s expectations and the reality (Brown, Miller, & Lawendowski, 1999; Carver & Scheier, 2011; de Ritter & de Witt, 2006; Hoyle, 2010; Zimmerman, 2000).

Self-Regulation Research

The Scope of Self-regulation Areas

In the last fifty years, elaboration of the theory of self-regulation has been in the focus of activities in many scientific fields. Self-regulation has been investigated in educational psychology, social cognitive theory and adjacent disciplines. Considerable research of self-regulation has been conducted also in health psychology on stress and coping behaviour. For instance, Carey, Carey, Carnrike and Meisler (1990) examined the relationship between learned resourcefulness and two common addictive behaviours, e.g., drinking and smoking. In the research male and female college students completed a series of research instruments, such as the Self-Control Schedule, the Quantity-Frequency-Variability questionnaire, and a smoking history form. Overall, the results provided correlational support for the notion that learned resourcefulness may protect young adults against substance abuse. Chassin and De Lucia (1996) have associated a variety of serious health risks with adolescent drinking, including the three leading causes of death among adolescence groups (i.e., unintentional injuries, homicide, and suicide) as well as unsafe sexual behaviour. Risk factors for adolescent drinking encompass, inter alia, alcohol availability and some
personality traits, particularly those indicating low self-regulation, and pleasurable beliefs about alcohol effects.

The predictions, derived from the self-regulation model, about variables moderating the relationship between the forms of substance (alcohol, tobacco, and marijuana) and problems associated with the use were tested by Wills, Sandy and Yaeger (2002). Likewise, the study of work motivation theories and related area of procrastination enhanced the understanding of self-regulation issues (Eerde, 2000; Senécal & Vallerand, 1995; Motiea, Heidaria, & Sadeghic, 2012).

There has been vast research conducted of the role played by self-regulation in academic learning. For instance, Veenstra, Lindenberg, Tinga and Ormel (2010) documented that low self-regulation of behaviour is associated with students´ drop-out and truancy. There is also some evidence that self-regulation predicts course grades. This prediction is stronger than that of standardized achievement test scores. Duckworth, Quinn, and Tsukayama (2012) found in middle school students, who were followed longitudinally, that self-control predicted changes in grades over time better than did IQ. Nota, Soresi and Zimmerman (2004) provided evidence that the cognitive self-regulation strategies proved to be a significant predictor of the students’ course grades in Italian (mother tongue), mathematics, and technical subjects in high school and in their subsequent average course grades and examinations passed at the university.

Components of Self-regulation

The self-regulation construct proves to fit well with well-known phenomena of human behaviour, such as control of attention (Carver & Scheier, 2011), control processes, self-organization (Carver & Scheier, 2002), and goal disengagement (Wrosch et al., 2003).

There is a large variability in the theoretical constructs of self-regulation of behaviour; however, the theories share two common characteristics: (1) self-regulation is conceived to be a dynamic motivational system related to goal-setting and goal attaining strategies; (2) it is connected with the control and regulation of emotions and impulsivity, which accompany goal
attaining. Self-regulation, in turn, affects the motivational system of the individual (Cameron & Leventhal, 2003).

There is extensive literature describing goal-setting and aim-directedness as important components of self-regulation (Austin & Vancouver, 1996; Carver & Scheier, 1998; Carver, 2004; de Ridder & de Wit, 2006; Elliott 2008; Mischel, Cantor, & Feldman, 1998; Schunk & Zimmerman, 1998; Schwarzer, 2001; Zimmerman, 2000). For instance, Carver and Scheier (2011) maintain that "goals always constitute key components of self-regulation of behaviour" (p.4). Emotions that accompany actions create simultaneous feedback about the adequacy of behaviour (Carver & Scheier, 1998).

The other significant component of self-regulatory processes – apart from goal-orientation – is the control of impulsivity (de Ridder & de Wit, 2006; Mischel et al., 1998). If the individual wants to attain long-term goals, he/she must have impulsivity under control. Some researchers (Vohs & Baumeister, 2011) consider this so important that they claim that self-regulation and impulsivity are synonyms. The research revealed that if individuals have problems with controlling impulsivity in their behaviour, they frequently fail to attain their personal goals (Baumeister & Heatherton, 1996; Baumeister, Heatherton, & Tice, 1994).

To sum up, there appear two components of self-regulation that play a decisive role in the behaviour of individuals. These are goal-orientation and impulsivity. In consequence, we placed these two components in the centre of the research presented in this paper.

**Individual’s Characteristics and Self-regulation**

It is well documented that self-regulation is linked to the individual’s characteristics that affect the planning and execution of behaviour. Paradoxically, little data is available how these characteristics have been developed in the individual. Most frequently self-regulation has been investigated in self-contained, small or medium-size groups of subjects. Little information has been obtained about self-regulation of behaviour in large samples, in different age groups and groups with varied socio-demographic characteristics, e.g., the level of schooling. Therefore, in order
to obtain well-grounded empirical data the primary purpose of the research presented in this article was to investigate self-regulation of behaviour in large, representative samples as well as provide data on gender and specific age groups within them.

As concerns the relationship of self-regulation to age of individuals, we respected the proposition of Zeidner, Boekaerts and Pintrich (2000) that "… research needs to carefully look at the development of self-regulatory skills over time. Thus we need to understand how biology and aging (maturation, senescence) change both the self-regulatory processes (goal-setting, monitoring, feedback control, self-evaluation, etc.) and the effects of self-regulatory skills" (p.764).

As concerns gender, a collaborative study of self-regulation skill in France, Germany, and Iceland (Gestsdóttir et al., 2014) revealed that girls outperformed boys only in Iceland. Other independent variables such as parental socioeconomic background (parental education and income) and gender in relationship to self-regulation among children were explored by Størksen et al. (2014). Results indicated that Norwegian girls outperformed boys in individual behavioural regulation (assessed by the Head–Toes–Knees–Shoulders task) and classroom behavioural regulation (rated by teachers on the Survey of Early School Adjustment). In addition, parental socioeconomic status related positively to girls' individual behavioural regulation but not to that of boys'.

In this paper we extended the scope of investigation to other individual characteristics besides age and gender. As seen in the objectives section, we concentrated also on the level of education of individuals as related to their self-regulation of behaviour.

**Instruments Used in Research on Self-regulation**

Self-regulation has been studied with a number of empirical instruments. The most frequent have been self-rating scales. For instance, Ryan and Connell (1989) developed an entire series of self-regulation questionnaires assessing domain-specific individual differences in motivation and regulation. They concentrated on assessing the regulation of a particular behaviour (e.g., exercising regularly) or class of behaviours (e.g., engaging
in religious activities). Each questionnaire asked why the respondent performed a behaviour (or class of behaviours). The reasons of the behaviour were categories to represent different styles of regulation or motivation (Ryan & Connell, 1989). Questionnaires were developed for each age cohort (late-elementary, middle school children and adults). Academic Self-Regulation Questionnaire (SRQ-A) was developed for assessing self-regulation in academic settings. The questionnaire asks about the reasons why children in late elementary and middle schools do their school work. The comparable SRQ for adults is referred to as the Learning Self-Regulation Questionnaire (SRQ-L).

Another commonly used research tool is Questionnaire on Self-Regulation (QSR) of Bandy and Moore (2010). This questionnaire is used to assess children’s ability to regulate negative emotions and disruptive behaviour, and to set and attain goals.

To investigate self-regulation of children and minors who live in institutional care, Vávrová (2015) developed a culture and social-fair instrument, the Self-Regulation Questionnaire in Children and Minors (SRQ-CM). The main effort of the investigation was to clarify the relationship between environmental factors and the level of self-regulation of young people.

There is one specific instrument which concentrates on measuring general (rather than domain-specific) self-regulation of behaviour of subjects. It is the Self-Regulation Questionnaire, originally developed by Brown, Miller, and Lawendowski (1999). This questionnaire is a self-rating device aimed on measuring self-regulation of behaviour in the adult population. In spite of the frequent use of this instrument in previous research, inconclusive results were obtained as concerns its factorial structure (Carey, Neal, & Collins, 2004; Neal & Carey, 2005; Potgieter & Botha, 2009; Vosloo et al., 2013; Dias & Garcia del Castillo, 2014), which contests its conceptual base. This instrument was used in the research presented in this paper, however, after adaptation and validation in the Czech environment.
Present Study

This research has two aims. The primary aim is to obtain data on the self-regulation of behaviour in a large, representative sample of adult subjects. We consider it highly important to have well empirically grounded data on self-regulation and these cannot be received by other means apart from measuring it in a representative sample of the population. Secondly, our aim is to compare the data on the self-regulation of behaviour obtained from the representative adult sample with the data from a specifically selected sample of the population. In this case, the specific sample consists of university students. The choice of this sample was motivated by the idea that university students – due to intensive efforts in learning regulation and systematic training for their future profession - may manifest a higher ability of self-regulation of goal planning and better control of impulses than the representative sample of adults. We assumed that these two samples have different patterns of self-regulation of behaviour due to prevailing daily activities (studying versus job responsibilities) which, in the long run, affects their self-regulation of behaviour in a different degree.

In view of the discussion presented in previous sections, in this study we shall relate the two dimensions of the self-regulation of behaviour (i.e., Goal Orientation and Impulsivity) in two samples (the representative and the student samples) to three variables: gender, age and level of education. We formed the following hypotheses:

H1: The student sample yields a higher score than the representative sample in Goal Orientation.
H2: The student sample yields a lower score than the representative sample in Impulsivity (i.e., students better control impulsivity).
H3: In both samples the score on Goal Orientation is higher than that on Impulsivity.
H4: In both samples the score on Goal Orientation of females is higher than that of males.
H5: In both samples the score on Impulsivity in males is lower than that of females (i.e., males better control impulsivity).
H6: In both samples there is a statistically significant difference among age groups in Goal Orientation scores.

H7: In both samples there is a statistically significant difference among age groups in Impulsivity scores.

H8: In both samples there is a statistically significant difference in Goal Orientation scores according to the level of education.

H9: In both samples there is a statistically significant difference in Impulsivity scores according to the level of education.

Methods

Participants

The measurements were conducted in two separate samples. The first sample was the representative sample of the Czech adult population ranging from 15 to 90 year-old with a mean age of 44.8 (S.D. = 16.82). It consisted of 1060 respondents.

The other sample was the student sample. It consisted of 1244 respondents who at the time of the research attended formal or informal university programmes in the region of Zlín in the Czech Republic. The student sample is assumed to well represent the population of university students in the particular Czech location. The age range of the student sample was 19 to 83 years, with the age group of 15-29 year to be proportionally largest (70 %). The structure of the samples is in Table 1.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Representative sample</th>
<th>Student sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>507</td>
<td>48</td>
</tr>
<tr>
<td>Female</td>
<td>553</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>1060</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1
The Structure of the samples
Table 1. Continued

<table>
<thead>
<tr>
<th>Age</th>
<th>Representative sample</th>
<th>Student sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-29</td>
<td>240 23%</td>
<td>856 70%</td>
</tr>
<tr>
<td>30-44</td>
<td>295 28%</td>
<td>178 15%</td>
</tr>
<tr>
<td>45-59</td>
<td>255 24%</td>
<td>2 0%</td>
</tr>
<tr>
<td>60-90</td>
<td>270 25%</td>
<td>192 16%</td>
</tr>
<tr>
<td>Total</td>
<td>1060 100%</td>
<td>1228 100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Representative sample</th>
<th>Student sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower secondary (ISCED 244)</td>
<td>143 14%</td>
<td>16 1%</td>
</tr>
<tr>
<td>Vocational (ISCED 353)</td>
<td>435 41%</td>
<td>28 2%</td>
</tr>
<tr>
<td>Upper secondary (ISCED 344)</td>
<td>332 31%</td>
<td>1030 83%</td>
</tr>
<tr>
<td>University</td>
<td>150 14%</td>
<td>170 14%</td>
</tr>
<tr>
<td>Total</td>
<td>1060 100%</td>
<td>1244 100%</td>
</tr>
</tbody>
</table>

Measures

The measuring tool was the Self-Regulation Questionnaire (SRQ), originally constructed by Brown, Miller and Lawendowski (1999). They based the instrument on the seven-phase model of the process of self-regulation of behaviour developed by Kanfer (1970) and Miller and Brown (1991). Accordingly, the seven dimensions of their instrument correspond to seven phases of the self-regulation process: (1) Attention to information input, (2) Evaluation by comparing oneself to a standard, (3) Willingness to consider change, (4) Engagement in a search for alternatives, (5) Devising a plan of action, (6) Implementing the plan, and (7) Evaluation of the plan. The questionnaire consists of 63 items; short versions of the questionnaire published in other studies varied from 21 to 31 items (Carey, Neal, & Collins, 2004; Neal & Carey, 2005; Vosloo et al., 2013).

The instrument uses a five-point interval scale with end points 1 = strongly disagree and 5 = strongly agree, to assess statements, e.g., Once I have a goal, I can usually plan how to reach it. It is important to emphasize
that the questionnaire measures the generic rather than the domain-specific self-regulation capacity of one’s behaviour.

The construction validity of SRQ was assessed in two studies (Carey, Neal, & Collins 2004; Neal & Carey, 2005) which however did not prove the seven theoretically assumed factors of self-regulation of behaviour. The long form (63 items) and the short form (31 items) were used also in South Africa by Potgieter and Botha (2009) and Vosloo et al. (2013) who confirmed the seven factors, however, their interpretation was different from the original model of SRQ. In the USA, Neal and Carey (2005) proved the two factor model with the dimensions Goal Orientation and Impulsivity, so did Dias and Garcia del Castillo (2014) in Portugal.

The Czech version of the questionnaire was adapted and validated in two rounds. In the first round, it was administered to 360 Czech university students. Four factors appeared to be the best factorial solution: (1) Goal Orientation (i.e., I usually proceed to accomplish my aims); (2) Impulsivity (i.e., I give up easily if facing an obstacle); (3) Self-direction (i.e., I do not notice the effects of my actions until it is too late); (4) Decision Making (i.e., As soon as I see a problem, I start looking for possible solutions). The four factors covered 27 items, which explained 43% of the total variance, with an Alpha of .88 (Gavora, Jakešová, & Kalenda, 2015). In the subsequent validation with a larger sample of Czech university students (n = 1139) the four factor model, which covered 22 items and explained 44% of the total variance (Alpha .85), was again confirmed (Jakešová, Kalenda, & Gavora, 2015). Alphas in the dimensions ranged from .50 to .78; the overall Alpha was .85. After a confirmatory factor analysis one item was excluded because of a low factor loading (.36). The CFA results were as follows: Chi² (df = 178, p = .00) = 65.148, Chi²/df = 3.783. GOF indexes: RMR = .052, RMSEA = .050, TLI = .887, CFI = .904, GFI = .944, AGFI = .927, PCLOSE = .452 signifying that the model fits the data well.

Because the present research was designed as broad survey administered in two large samples, for practical reasons only two dimensions, Goal Orientation and Impulsivity, were used, each with 4 items (Table 2). The selection of these two dimensions was based on the assumption that (1) they represent the core of the self-regulation capacity; (2) and were confirmed in other studies (Neal & Carey, 2005; Dias & Garcia del Castillo, 2014).
Table 2

*Items of ScSRQ-CZ and factor loadings for the representative and the student samples*

<table>
<thead>
<tr>
<th>Goal Orientation</th>
<th>Representative sample</th>
<th>Student sample</th>
<th>Impulsivity Representative sample</th>
<th>Student sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>I stick to my plans if they work well.</td>
<td>.809</td>
<td>.783</td>
<td>I have ideas but I cannot decide how to accomplish them.</td>
<td>.661</td>
</tr>
<tr>
<td>I usually proceed to achieve my goals.</td>
<td>.753</td>
<td>.710</td>
<td>Even if I decide to act according to a plan, I have problems to accomplish it.</td>
<td>.737</td>
</tr>
<tr>
<td>I have personal standards which I observe.</td>
<td>.721</td>
<td>.639</td>
<td>I hesitate when I am expected to act.</td>
<td>.643</td>
</tr>
<tr>
<td>I know how I want to be.</td>
<td>.747</td>
<td>.496</td>
<td>I give up easily if I come across an obstacle.</td>
<td>.564</td>
</tr>
</tbody>
</table>

Alphas

<table>
<thead>
<tr>
<th></th>
<th>Representative sample</th>
<th>Student sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.763</td>
<td>.713</td>
</tr>
<tr>
<td></td>
<td>.566</td>
<td>.692</td>
</tr>
</tbody>
</table>

This short version of the instrument will be referred to as **ScSRQ-CZ** (Sc stands for screening). A high score on Goal Orientation assumes better self-
regulation. Conversely, a low score on Impulsivity supposes a better ability to reduce impulsivity.

The validation of ScSRQ-CZ was performed separately for the student sample and for the representative sample. In the student sample, the Alpha for Goal Orientation was .71 and for Impulsivity it was .69 (total for 4 items), and the total explained variance was 57%. In the representative sample the Alpha in Goal Orientation was .76 and for Impulsivity it was .57 (total for 4 items). The total explained variance was 46%. The two dimensions correlate negatively, as expected: \(-.171\) (\(p = .00\)).

The data on the representative sample was gathered by the Stem/Mark Agency (Prague) through individual CAPI (Computer Assisted Personal Interviewing). The data on the student sample was collected by the authors and research assistants. Students filled in the questionnaire in classrooms during their regular courses.

**Results**

First, we shall inspect the differences between the samples on both dimensions of ScSRQ-CZ. As presented in Table 3, there was no statistically significant difference between the representative and the student samples on Goal Orientation (Mann-Whitney U-test \(Z = -.919; \ p = .055\)). This is in contrast with our hypothesis (H1) which assumed a higher score on Goal Orientation in favour of the student sample. However, the significance level was exceeded only slightly (by .005). This in effect means that the student sample is better in Goal Orientation than the representative sample, however, the difference is small. As concerns Impulsivity, there was no statistically significant difference between the representative and the student samples (\(Z = -.796; \ p = .426\)). This again is in contrast with the hypothesis (H2), because we assumed that students are less emotional and are more detached in self-regulation of behaviour due to the rather easy-going life and open climate in the Czech university environment.

As expected, both samples scored higher on Goal Orientation than on Impulsivity (H3). We assumed a higher score on Goal Orientation because the opposite results would be critical, indicating that one’s actions are governed by strong emotions rather than by rational planning and acting. In
Goal Orientation the score was high, much above the midpoint of the scale (1 - 5), which signifies a very good perceived ability of the respondents to plan actions, set goals and control their accomplishment. Conversely, the low score on Impulsivity indicates a very good ability to control one’s impulses when performing actions. While the mean scores on Goal Control of the two samples are almost identical (difference of .099), on Impulsivity the difference is somewhat larger (.678), but still negligible. In Impulsivity the median is the same in both samples.

Table 3  
*Descriptive data on ScSRQ-CZ of the representative and the student samples*

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Representative Sample</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Student Sample</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Median</td>
<td>S.D.</td>
<td>N</td>
<td>Mean</td>
<td>Median</td>
<td>S.D.</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>Goal Orientation</td>
<td>1060</td>
<td>4.01</td>
<td>4.00</td>
<td>.81</td>
<td>1242</td>
<td>4.10</td>
<td>4.25</td>
<td>.66</td>
<td>.055</td>
<td></td>
</tr>
<tr>
<td>Impulsivity</td>
<td>1060</td>
<td>2.76</td>
<td>2.75</td>
<td>.75</td>
<td>1241</td>
<td>2.80</td>
<td>2.75</td>
<td>.79</td>
<td>.426</td>
<td></td>
</tr>
</tbody>
</table>

As concerns gender, we expected higher scores of females on Goal Orientation (H4) and, conversely, lower scores on Impulsivity in males in both samples (H5). The assumption that males better manage impulses was based on the notion that they are generally less emotional and less anxious. On the other hand, females were supposed to be more stable in setting their goals of personal actions and are more reliable in their accomplishment. As Table 4 shows these assumptions were not completely confirmed. In Goal Orientation there was a statistically significant difference in favour of females only in the student sample, whereas in the representative sample no statistically significant difference was proven. In Impulsivity males had statistically lower scores in both samples thus demonstrating that they are less impulsive and can better control their emotions. H5 was confirmed in both samples.
Table 4

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Representative Sample</th>
<th></th>
<th></th>
<th></th>
<th>Student Sample</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gender</td>
<td>n</td>
<td>Mean</td>
<td>S.D.</td>
<td>Sign.</td>
<td>n</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Goal Orientation</td>
<td>Male</td>
<td>507</td>
<td>4.03</td>
<td>.76</td>
<td>.731</td>
<td>333</td>
<td>4.02</td>
<td>.72</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>553</td>
<td>3.98</td>
<td>.86</td>
<td>.909</td>
<td>909</td>
<td>4.13</td>
<td>.63</td>
</tr>
<tr>
<td>Impulsivity</td>
<td>Male</td>
<td>507</td>
<td>2.67</td>
<td>.75</td>
<td>.003</td>
<td>332</td>
<td>2.65</td>
<td>.81</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>553</td>
<td>2.85</td>
<td>.75</td>
<td>.000</td>
<td>903</td>
<td>2.86</td>
<td>.78</td>
</tr>
</tbody>
</table>

As concerns the age, we hypothesized that in Goal Orientation there would be statistical differences among the age groups (H6). This hypothesis was confirmed in both samples (p=.015; p=.000, respectively). A close look at Table 5 reveals that the mean scores rise with age (with the exception of the oldest age group in the student sample). This suggests that the experiences that one accumulates in the course of life may contribute to the improvement of goal planning and its accomplishment.

Regarding Impulsivity, we also hypothesized statistical differences among age groups (H7). However, the hypothesis was confirmed only in the student sample (p=.000). Conversely to Goal Orientation, we assumed that the scores on Impulsivity would drop with age. We expected that life experiences contribute to the development of a higher ability to balance emotions in older ages. This assumption did not prove. The findings about the relationship of self-regulation of behaviour to age groups, however, must be taken cautiously because of the uneven number of respondents in the individual age groups, especially in the student sample. For instance, in the age group 45-59 years, there were only two respondents and the age span for the oldest groups in both samples was 30 years (Table 1).
Table 5
Age differences in the representative and the student samples

<table>
<thead>
<tr>
<th>Age</th>
<th>Goal Orientation Mean</th>
<th>Goal Orientation S.D.</th>
<th>Impulsivity Mean</th>
<th>Impulsivity S.D.</th>
<th>Goal Orientation Mean</th>
<th>Goal Orientation S.D.</th>
<th>Impulsivity Mean</th>
<th>Impulsivity S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-29</td>
<td>3.91</td>
<td>.79</td>
<td>2.73</td>
<td>.70</td>
<td>4.05</td>
<td>.66</td>
<td>2.86</td>
<td>.78</td>
</tr>
<tr>
<td>30-44</td>
<td>3.99</td>
<td>.82</td>
<td>2.78</td>
<td>.74</td>
<td>4.26</td>
<td>.65</td>
<td>2.54</td>
<td>.75</td>
</tr>
<tr>
<td>45-59</td>
<td>4.06</td>
<td>.76</td>
<td>2.79</td>
<td>.79</td>
<td>4.88</td>
<td>1.77</td>
<td>2.00</td>
<td>.35</td>
</tr>
<tr>
<td>60+</td>
<td>4.07</td>
<td>.88</td>
<td>2.77</td>
<td>.80</td>
<td>4.22</td>
<td>.64</td>
<td>2.84</td>
<td>.85</td>
</tr>
<tr>
<td>p</td>
<td><strong>.015</strong></td>
<td>.664</td>
<td><strong>.000</strong></td>
<td>.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The level of education of respondents was believed to be a strong variable that affects the level of self-regulation of behaviour. We assumed that the higher the levels of education, the better scores are achieved on Goal Orientation, and conversely, lower scores on Impulsivity. These assumptions were not confirmed in full. There was no statistically significant difference in Goal Orientation both in the representative sample (Chi$^2 = 4.75$, df = 3, $p = .191$) and the student sample (Chi$^2 = 3.59$, df = 5, $p = .610$). Thus H8 was disproved. As concerns Impulsivity, in both samples the hypothesis (H9) was confirmed. Respondents with university degrees better control their impulsivity, and vice versa, respondents with lower education are more impulsive (the representative sample Chi$^2 = 21.58$; df = 3, $p = .000$; the student sample Chi$^2 = 20.85$, df = 2, $p = .000$).

Overall, the level of education of respondents proved to be an important factor which distinguishes those with high and low impulsivity. People who have higher education seem to be more cautious and deliberate than those with lower education. As concerns Goal Orientation, the same relationship is not true. This shows that goal setting, monitoring and achieving has different relationships to the level of education; or to put it differently, a given level of education is not necessarily a factor that precludes a different goal-related behaviour of respondents.
Discussion

In this research we used a self-rating questionnaire to assess self-regulation of adults and university students in two large samples in the Czech Republic. While the students are also adults in the demographical sense, we claimed that they have specific self-regulation characteristics which we assumed to be different from those of adults in the representative sample of the Czech population. This hypothesis was not confirmed as concerns the mean scores both on Goal Orientation and Impulsivity. The two samples yielded similar mean scores in both dimensions, while the score on Goal Orientation was much higher than on Impulsivity.

These findings are important for three reasons. (1) We have evidence that the two components of self-regulation of behaviour are similar in two large and demographically varied samples in the same country. This strengthens our knowledge of how Goal Orientation and Impulsivity abilities are conceived in populations. (2) In contrast to other research on self-regulation of behaviour, which has been most frequently conducted with smaller samples and with samples of a specific section of the population (most typically with university students), the advantage of this study is in the large samples of respondents, of which one was representative, which guarantees that few uncontrolled factors came into play. (3) The findings support the stability of data received with the self-rating instrument ScSRQ-CZ that we used with the two samples.

Apart from these findings, we received evidence of the contrasting character of Goal Orientation and Impulsivity. They are both important in self-regulation of behaviour, however, in an inverse direction. Goal setting, monitoring, control and achieving require a certain level of emotional investment, but not in such a manner and style that it interferes with goal performance. Lack of impulsivity is such unfavourable characteristic.

As concerns gender, no statistical difference was found between females and males in Goal Orientation in the representative sample. This supports, in fact, the strengths of the findings of the entire representative population. In the student sample, females were superior to males in Goal Orientation. However the size of the female´s subsample was three times larger than that
of males. This discrepancy might cause fluctuations that affected the results of the males’ subsample.

Age was assumed to be a factor that affects self-regulation of behaviour ability. We confirmed differences among age groups in Goal Orientation in both samples. As we have explained, experiences which people accumulate in the course of life may contribute to the improvement of goal planning and their accomplishment. Thus, age differences plausibly reflect these tendencies. The level of education proved to be an important factor which distinguishes those with high and low impulsivity rather than goal orientation.

Overall, the demographic variables that we investigated aid in the understanding of the phenomenon of the ability to self-regulate one’s behaviour. Gender, age, and the level of education are important variables that affect the complexity of self-regulation. However, more research must be conducted that would clarify the functioning of these variables in more detail.

It should be noted that self-regulation ability has been most typically investigated in specific domains (for instance, in academic learning or health related behaviour). Our attempt differed from these studies by taking into account the generic ability of self-regulation of behaviour. In other words, we attempted to capture a more general, across the domain, strand of self-regulation. Thus the results have broader usage and application.

It should also be noted that we did not concentrate on self-regulated behaviour per se, that is, in real life situations; rather, we gathered data on how respondents conceived their abilities in such behaviour. Conceiving self-regulation is in common with one’s conceptualisation of self-regulation and with one’s beliefs in potentials in goal performance and the control of impulsivity. Research into real-life self-regulation requires other methodological devices, the observation of performance, first of all, which we were unable to accomplish at this point in our research endeavours.
References


**Notes**

Note 1. Apart from quantitative studies on self-regulation conducted with questionnaires, there is a number of investigations based on qualitative methods, e.g., on “construct pairing“ (Human-Vogel, 2006) or focus group interviews (Vávrová & Gavora, 2014; Vávrová, 2015).
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Revising and Validating Achievement Emotions Questionnaire – Teachers (AEQ-T)

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Revising and Validating Achievement Emotions Questionnaire – Teachers (AEQ-T)

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Abstract
Achievement Emotions Questionnaire - Teachers (AEQ-T) measures teachers’ anger, anxiety, and enjoyment related to instruction. The purpose of this research is to revise and validate AEQ-T to include pride and frustration. Also, this study aimed to replicate previous research on anger, anxiety, and enjoyment and validate this expanded measure in an Asian context. The revised AEQ-T was tested using Exploratory Factor Analysis for 150 Japanese teachers, and then cross-validated with 208 Korean teachers using Confirmatory Factor Analysis. Results showed that four emotions of anger, anxiety, enjoyment, and pride had acceptable levels of internal consistency and clear factor structure. However, frustration items had low reliability and cross-loaded with anger factor. This study provides empirical evidences to include pride to measure teachers’ emotions, and suggests the need to develop a more refined understanding and distinction between anger and frustration.

Keywords: Teacher emotions, Achievement Emotion Questionnaire –Teachers (AEQ-T), instrument validation, cross-cultural study.
Revisión y Validación del Cuestionario de Emociones de Logro-Profesores (AEQ-T)

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Resumen

El Cuestionario de Emociones de Logro - Profesores (AEQ-T) mide la ira de los maestros, la ansiedad y el placer en relación con la instrucción. El propósito de esta investigación es revisar y validar AEQ-T para incluir el orgullo y la frustración. Además, este estudio tiene como objetivo replicar la investigación previa sobre la ira, la ansiedad y el placer y validar esta medida extendida en un contexto asiático. El AEQ-T revisado fue probado usando un análisis factorial exploratorio para 150 maestros japoneses y, luego, revalidado con 208 maestros coreanos utilizando un análisis factorial confirmatorio. Los resultados mostraron que las cuatro emociones de ira, ansiedad, placer y orgullo tienen un nivel aceptable de consistencia interna y claridad en el factor de estructura; sin embargo, los elementos de frustración tuvieron una baja confiabilidad y se cruzaron con el factor de ira. Este estudio proporciona evidencia empírica para incluir el orgullo en la medición de las emociones de los profesores y plantea la necesidad de desarrollar una comprensión y una diferenciación más refinadas entre la ira y la frustración.

Palabras clave: Emociones del profesorado, Cuestionario de Emociones de Logro, AEQ-T, validación de instrumentos, estudio transcultural.
Teaching is an emotionally charged profession, and thus the significance of emotions has been receiving increasing attention in recent years (e.g., Pekrun & Linnenbrink-Garcia, 2014; Schutz & Pekrun, 2007; Schutz & Zembylas, 2009). Research on teacher emotions has emphasized their central role by investigating various type and intensity of teachers’ emotions (e.g., Sutton, 2007), the impact of teachers’ emotions on their professional lives including their identity, well-being, effectiveness (e.g., Day & Gu, 2007; Hong, 2010), and the way teachers display and regulate their emotions (e.g., Sutton & Harper, 2009). As such, teacher emotion research has expanded significantly in its scope and depth, however, research methodology has not been diversified much. Qualitative interviews and observations were employed most dominantly including individual interviews (e.g., Darby, 2008), focus group interviews (e.g., Cross & Hong, 2012), and field observations (e.g., Zembylas, Charalambous, & Charalambous, 2014). Also, experience sampling methods (e.g., Becker, Goetz, Morger, & Ranellucci, 2014; Jones & Youngs, 2012) began to be used more frequently. However, quantitative scales to measure teachers’ discrete emotions are largely lacking. Thus, this study focuses on developing and validating a measure of teacher emotions. In particular, a revised Achievement Emotions Questionnaire – Teachers (AEQ-T), which includes pride and frustration in addition to enjoyment, anger, and anxiety was tested and validated with Japanese and Korean teachers.

**Rational Empirical Strategy of Test Construction**

When developing and validating an instrument, previous researchers suggest that a combination of theory and empirical investigation be implemented in the design process (Blake & Sackett, 1999; Pekrun et al., 2004; Schwartz, 1978). That is, theory should be used to guide decisions about what latent variables to use, in our case emotions, as well as other convergent and divergent constructs to assess along with our target variables. However, one cannot rely on theory alone to guide the instrument validation procedure or else there exists a danger of unproven and potentially untrustworthy measurement, which is not based on reality, but rather solely one’s beliefs.
Therefore, scale construction best practice also includes testing the reliability and validity of a newly designed theoretical instrument through empirical research. Using empirical analysis alone is insufficient due to the biases of researchers engaged in instrument construction and the idiosyncrasies of specific samples used to validate (Butcher, 2000). Thus, in the current study, both theoretical and empirical considerations were leveraged to design and validate the instrument in a procedure known as the rational-empirical strategy of test construction (Pekrun et al., 2002, 2004; Schwartz, 1978). Therefore, in the following, theoretical reasons are discussed for expanding the AEQ to include frustration and pride. However, in alignment with the rational-empirical strategy of test construction, the revised instrument was also tested empirically to assess the utility of the theoretically based revisions.

### Theoretical Perspective

Emotion has been defined as “socially constructed, personally enacted ways of being that emerge from conscious and/or unconscious judgments regarding perceived successes at attaining goals or maintaining standards or beliefs during transactions as part of social-historical contexts” (Schutz, Hong, Cross & Osbon, 2006, p. 344). This definition highlights key attributes of emotions that even if an individual experiences emotions, social matrix inherently influences the type and intensity of emotions, as well as why and how the individual experiences certain emotions.

“Socially constructed” nature of emotions signifies that social relations are perceived and appraised in relation to the individual’s goals and standards (Denzin, 1984; Lazarus, 1991). As Schutz and DeCuir (2002) discussed, an individual’s goals provide reference points to evaluate how successful the individual views himself/herself in their effort to achieve the goals. As the definition emphasized ("from conscious and/or unconscious judgments regarding perceived successes at attaining goals or maintaining standards or beliefs"), the appraisal of their current situation in relation to their goals - whether the evaluation is conscious or unconscious - is essential for the emotions to be elicited (Frijda, 1993). Lazarus (1991, 1999) further
unpacked the process of emotional experiences by differentiating primary and secondary appraisals.

The primary appraisal involves goal relevance and goal congruence. When an individual’s situation is appraised as relevant and congruent, positive emotions are experienced. However, if the situation is relevant but incongruent with the individual’s goals, then negative emotions are experienced. Secondary appraisals are about judgments the individuals make in relation to their coping potential to handle the situation and possible blame or credit to make. Secondary appraisal contributes in eliciting more specific emotions. For instance, when a teacher experiences negative emotions due to students’ disruptive behaviors, if the teacher has low coping potential, then he/she may experience anxiety. However, in the same situation if the teacher blames others, then he/she may experience anger.

These emotions teachers experience through primary and secondary appraisals are embedded in their social context, both immediate and distal environments. This is another key aspect that the definition of emotions emphasized (“as part of social-historical contexts”) (Ratner, 2000, 2007). As emotions are relational and require person-environment transaction, a teacher can experience various emotions from the same classroom depending on the way each student interacts with the teacher and the whole classroom dynamics (Schutz et al., 2006). In particular, Klassen, Perry, and Frenzel (2012) noted the importance of relatedness and socially constructed nature of teachers’ emotions, and its connection to intrinsic motivation.

Teachers’ emotions are embedded in not only classroom or school environment but also a larger social-historical context. As Ratner (2007) argued, emotions are “rooted in macro cultural factors, such as social institutions, artifacts, and cultural concepts. Emotions have cultural origins, characteristics, and functions” (p. 89). Thus, it is important to note that emotions are reflective of the social-historical context such as cultural norms and rules, and ethical values and beliefs. Also, although emotions are likely to be tied to a socio-historical context (Ratner, 2007) and differences in language (Wierzbicka, 1984), there exists some empirical evidence that there may be some universal or “basic” emotions (Ekman, Friesen, & Ellsworth, 1982; Matsumoto, 1992; Oatley & Johnson-Laird, 1987). According to Oatley and Johnson-Laird’s (1987) research working towards a cognitive
theory of emotions, basic emotions, which are recognized and perceived similarly across cultural contexts, include enjoyment, sadness, anxiety, anger, and disgust. However, in teacher emotion research, there is a lack of empirical investigation, especially large-scale quantitative studies, to examine if teachers’ discrete emotions are different or similar given different cultural contexts. As an attempt to fill this gap, this study focuses on measuring teachers’ emotions in Asian cultural context, discussed in depth below, in addition to testing a proposed revision to the AEQ-T (Frenzel et al., 2010).

Existing studies have also explored the relationship between teachers’ emotions and other psychological constructs such as teacher efficacy and job satisfaction. For instance, Moè, Pazzaglia, and Ronconi’s (2010) path model showed that teachers’ positive emotions positively impact their job satisfaction. Stephanou, Gkavras, and Doulkeridou’s (2013) data on elementary teachers showed that higher teacher efficacy predicts more intense positive emotions. In the current study, we investigate convergent validity by exploring the relationship between teacher’s emotions, teacher efficacy, and job satisfaction.

In the following section, we discuss Achievement Emotions Questionnaire – Teachers (AEQ-T) in relation to discrete emotions teachers experience frequently, and provide justifications to revise and validate AEQ-T in order to measure teachers’ emotions more comprehensively.

**Achievement Emotions Questionnaire – Teachers (AEQ-T)**

Given the scarcity of available instrument to measure teachers’ emotions, Frenzel and her colleagues (2010) developed Achievement Emotions Questionnaire – Teachers (AEQ-T) that includes three emotions of enjoyment, anger, and anxiety. Although there are several instruments to measure various aspects of teachers’ emotions (e.g., Teacher Emotional Labour Strategy Scale (TELSS) by Yin (2012), Emotion Regulation Ability (ERA) Scale by Brackett, Palomera, Mosja-Kaja, Reyes, & Salovey (2010), Emotional Intelligence Scale (EIS) by Chan (2006)), AEQ-T is the only available instrument that measures discrete emotion that teachers experience in relation to their classroom teaching. Positive and Negative Affect Scale
(PANAS) has also been used to measure teachers’ discrete emotions (e.g., Jo, 2014), however the items measure general emotion, instead of measuring emotions related to teachers’ classroom teaching. In the field of student emotion research, Pekrun and his colleagues developed Achievement Emotion Questionnaire (AEQ) to measure students’ emotions, which included enjoyment, hope, pride, relief, anger, anxiety, shame, hopelessness, and boredom during class, while studying, and when taking tests and exams (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). Sharing the same theoretical assumption with AEQ, in that goals and appraisals are the antecedents of emotional experiences, Frenzel and her colleagues (2010) developed AEQ-T to measure teachers’ emotions related to teaching.

Frenzel and her colleagues justified the selection of enjoyment, anger, and anxiety based on their salience in the literature and everyday life (Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009). Enjoyment is one of the most dominant positive emotions teachers experience. When classroom transactions are in line with the specific goals teachers set for the lesson, teachers experience enjoyment (Frenzel et al., 2009; Sutton & Wheatley, 2003), which is also referred to as emotional rewards by Hargreaves (2005). In terms of negative emotions, teachers frequently experience anger, when the classroom goals are not realized and teachers appraise that it is caused by students or other people (Chang, 2009; Sutton, 2007). In other words, anger is experienced when teachers blame undesirable outcomes to someone else such as students’ misbehaviors/laziness and parents’ lack of caring. Besides anger, anxiety is also frequently experienced by teachers, especially when they doubt their coping potential to handle challenging situations or to meet certain classroom goals (Darby, 2008). Beginning teachers tend to experience more anxiety due to their low competence (Chang, 2009). Also, the pressure to increase standardized testing scores can possibly contribute to teachers’ anxiety (Frenzel, 2014).

These three emotions are undoubtedly dominant emotions teachers experience in their daily classroom transactions, however we argue that teachers experience other emotions as well. It is important to measure not only the aforementioned three emotions, but also other emotions in order to gauge the full range of teacher emotions, in particular, frustration and pride.
Other Discrete Emotions Relevant to Teaching: Frustration and Pride

Recently, researchers have distinguished between several negative emotions that may arise in classroom teachers. Of particular interest is the difference between anger and frustration. According to Sutton (2007), anger is experienced when teachers make a primary appraisal that a situation is incongruent with their goals and a secondary appraisal that an individual is to blame. Frustration is similar to anger in that there exists an initial primary appraisal that an event is relevant and incongruent with one’s goals. However, frustration differs from anger with regard to the secondary appraisal. That is rather than blaming an individual, in frustration circumstance is blamed (Roseman, 2001). Given that teaching is circumstantial in nature, frustration, along with anger, may be an important emotion to assess. Furthermore, Chang (2009) noted that frustration is related to low controllability of the situation. If teachers think that the incongruence between their goals and the classroom transaction is attributed to less controllable issues such as educational system or the students’ family background, then they are more likely to experience frustration. Sutton’s (2004) empirical data showed that frustration was a relevant emotion discussed by teachers within teacher emotion diaries and that it was in fact perceived differently than anger. For the aforementioned reasons, we intended to extend the scope of the AEQ-T to include frustration, which may be a fruitful emotion to investigate based on theoretical and empirical research on teacher emotions.

A second emotion that we thought was particularly relevant to the teaching process was pride. Pride is a positive emotion that is salient in academic settings in both students and teachers (Goetz, Frenzel, Pekrun, Hall, & Lüdtke, 2007). Pekrun and his colleagues’ control-value theory of achievement emotions classified emotions based on the three-dimensions: valence (positive-negative), the level of activation (activating-deactivating), and object focus (activities-outcomes) (Pekrun, 2006; Pekrun et al., 2011). According to this taxonomy, pride is positive, retrospective outcome emotion linked to prior success. Tracy and Robin (2004, 2007) further clarified that pride is elicited when individuals direct attentional focus to the self and appraise that an event is congruent with positive self-
representations. This process entails making causal attributions that the self is credited as the cause of the event. In other word, pride results from attributions to internal, unstable, controllable causes (Lewis, 2000; Smith & Lazarus, 1993; Weiner, 1985). For example teachers may experience pride when they appraise that their students’ learning and achievement are caused by teachers’ instructional and interpersonal effort (Golby 1996; Trigwell, 2012).

Pride functions to promote positive behaviors and contributes to increase a genuine sense of self-esteem (Herrald & Tomaka, 2000). Thus, Teachers who feel pride about their teaching tend to seek and implement effective teaching strategies (Sutton & Wheatley, 2003). As such, pride appears to be a theoretically sound emotion to investigate in teachers. Some empirical work has been conducted on measuring pride as a teacher emotion (Trigwell, 2012; Trigwell & Prosser, 2004). For example, Trigwell’s study (2012) showed that pride loaded as a separate factor that can be distinguished from other emotions. Thus we sought to include pride as an emotion on the revised AEQ-T in addition to enjoyment, anger, anxiety, and frustration.

Understanding Teachers’ Emotions in Wider Cultural Contexts

As we addressed above, emotions are embedded in a social-cultural context, and thus they are shaped by and nuanced from shared culture of a society. Thus, it is critical to understand teachers’ emotions not only within European-American culture, but also from other cultural perspectives. Teacher emotion research has been dominantly conducted with American or European teachers. In particular, three existing studies that used AEQ-T are based on German teachers (Becker, Keller, Goetz, Frenzel, & Taxer, 2015; Frenzel, Goetz, Stephens, & Jacob, 2009) and Canadian teachers (Klassen, Perry, & Frenzel, 2012). Although there are several cross-cultural studies for students’ emotions measured by Achievement Emotions Questionnaire (AEQ) (e.g., Frenzel, Thrash, Pekrun, & Goetz, 2007; Yamac, 2014), cross-cultural studies to establish the construct comparability of teacher emotions across samples from different cultural backgrounds are scarce. Thus, it is largely unknown whether teachers in different cultural contexts experience and report discrete emotions differently. Thus, this study includes Asian
teachers (Japanese and Korean teachers) to test if the three emotions included in the original AEQ-T (anger, anxiety, and enjoyment) can be replicated in the Asian teachers, and to expand our understanding on teachers’ emotions in cross-cultural contexts.

**Research Questions**

The purpose of this research is to evaluate the usefulness and quality of the revised AEQ-T after including pride and frustration, in addition to enjoyment, anger, and anxiety. Specifically this research seeks to answer the following questions: (1) Does the revised AEQ-T demonstrate high internal consistency, factor structure, and convergent validity?, and (2) Is the revised AEQ-T replicated and validated with teachers in Asian contexts (Japan & Korea)?

Based on our understanding of the literature and previous research, we predict that the revised AEQ-T will demonstrate psychometrically sound properties. Thus, we predict that frustration and pride will prove to be useful teacher emotions to assess beyond the original three emotions (enjoyment, anger, and anxiety). We make this prediction because of the theoretical differences between anger and frustration (Sutton, 2004, 2007; Roseman, 2001) and the previous literature showing the existence of pride in teachers during instruction (Golby 1996; Trigwell, 2012). Next we predict that the revised AEQ-T will be replicated and validated with teachers in Asian contexts. As we discussed above, basic emotions are recognized and perceived similarly across cultural contexts (Ekman, Friesen, & Ellsworth, 1982; Matsumoto, 1992; Oatley & Johnson-Laird, 1987). Therefore, we predict that enjoyment, anxiety and anger, which are emotions included in the original AEQ-T, will be replicated in the Asian contexts. Pride and frustration are not included as basic emotions and those need to be validated, which is a goal of the current study.

**Methods**

**Participants**
As the goal of this study is to validate the emotions of the original AEQ-T instrument (anxiety, enjoyment, and anger) cross culturally, especially to Asian cultures, while expanding to include frustration and pride, Japanese and Korean teacher samples were included, instead of using two samples from a single country. Although Japan and Korea share similar Asian cultural background, each country holds different values on educational systems and teachers’ statuses in the society. For instance, Korean culture values higher education more than Japan. Consequently 92% of high school students pursue college degrees in Korea, while it is only 58% in Japan. Also, due to the recent earthquake in Japan in 2011, Japanese government has largely cut down teachers’ salary and the public tends not to encourage their children to become teachers. Global Teacher Status Index Report (2013) showed that teacher status index ranking is 16.2 in Japan and 64 in Korea, where 100 is the highest score. Thus, by investigating the revised AEQ-T scale for Japanese and Korean teachers, we could explore if the teachers’ emotions in the scale were generalizable in different cultures.

**Japanese sample.** The Japanese sample consisted of 150 school teachers. There were 87 male and 58 female teachers. Five teachers did not specify their gender. The mean years of teaching experience was 16.79. Among them, 25.3% of the teachers (N=38) was from elementary school, 26.7% of the teachers (N=40) was from junior high school, and 32.0% of the teachers (N=48) was from high school. 13 teachers taught across grades 7 to 16. 11 teachers did not specify their grade level(s).

**Korean sample.** The Korean sample consisted of 208 school teachers. There were 45 male and 163 female with the mean years of teaching experience 14.85. Among them, 32.2% of the teachers (N=67) were from elementary school, 28.8% of the teachers (N=60) were from junior high school, and 38.5% of the teachers (N=80) were from high school. One teacher did not provide grade level information.

**Instruments**

The revised AEQ-T consisted of a total of 20 items including four items for each of the five emotions (enjoyment, anger, anxiety, pride, and frustration) with a 4-point likert scale ranging from 1 (strongly disagree) to 4 (strongly
agree). Based on the English version of the original AEQ-T (Frenzel et al., 2010), an expert panel consisted of three renowned scholars in the field of teacher emotion research and the researchers of this project were first asked to independently review each item of the AEQ-T for its relevance, clarity, and importance. Once the individual reviews were completed, the expert panel and researchers discussed each item in depth by triangulating various literature sources addressed above. Through the review and discussion processes, original items of AEQ-T were revised and new items were added as well. One enjoyment item, “I generally have so much fun teaching that I gladly prepare and teach my lessons” was revised to “I generally have fun preparing my lessons”, in order to avoid complicated expression. Also, one anger item, “Teaching generally frustrates me” was removed and replaced to “Some days teaching just infuriates me”, because the original item reflects frustration, not anger.

In terms of the frustration emotion, the removed anger item from AEQ-T (“Teaching generally frustrates me”) was added to the frustration section. One frustration item (“Getting students to engage with learning is frustrating”) was adopted from Trigwell’s (2012) Emotions in Teaching Inventory (ETI). The other two frustration items (“I often feel frustrated while working with students” & “I think generally, frustration is a part of being a teacher”) were developed through the ongoing discussions with the expert panel. For the pride emotion, three items were adopted from Trigwell’s (2012) Emotions in Teaching Inventory (ETI): “I am proud of the way I am teaching”, “I get a feeling of pride as a result of my work”, and “I feel proud of the way I prepare for my teaching.” One pride item (“Thinking about my success as a teacher makes me feel proud”) was developed through the discussion with the expert panel.

The original AEQ-T consisted of two sets of scales for three emotions: (1) General emotions related to overall teaching experiences (e.g., “I generally enjoy teaching.”), and (2) Group-specific emotions related to teaching a specific class (e.g., “I enjoy teaching these students.”). In this study we adopted the general emotion section, as secondary school teachers often teach more than one class. Asking general emotions is more appropriate to obtain a comprehensive understanding about their emotional experiences.
In order to test convergent validity, Teachers’ Sense of Efficacy Scale (TSES) (Tschannen-Moran & Hoy, 2001) that was validated for measurement invariance for three Asian countries: China, Korea, and Japan and reduced to 9-items (Ruan et al., 2015) was used. The reduced TSES consisted of three sub-scales (efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement), including three items for each sub-scale. All items were measured on a nine-point Likert scale ranging from 1 (nothing) to 9 (a great deal).

Teachers’ Career Satisfaction Survey (TCSS) developed by the International Association for the Evaluation of Educational Achievement (2011) was also used for convergent validity test. Most teacher job satisfaction instruments, including Teaching Satisfaction Survey by Ho and Au (2006), were constructed and validated using teacher samples from a single country, which have potential limitations due to their specific cultural and national contexts. TCSS was developed by a large team of experts and researchers from multiple countries, and it was field tested for validity and reliability check. TCSS has been adopted for international research projects such as Progress in International Reading Literacy Study (PIRLs) and Trends in International Mathematics and Science Study (TIMSS) assessments (Martin & Mullis, n.d.). Since this study involves teachers from more than one country, TCSS is an optimal instrument to measure teacher satisfaction. TCSS was designed to measure teachers’ overall job satisfaction and consisted of 6 items with a four-point Likert scale ranging from 1 (agree a lot) to 4 (disagree a lot).

All three instruments were translated from English into Japanese and Korean through translation and back-translation procedure (Sperber, Devellis, & Boehlecke, 1994), and then validated its comparability and interpretability by another expert panel group consisting of Japanese and Korean scholars who are fluent in both English and the target language for translation. Also, the translated version was pilot tested with a small group of teachers in each country to ensure that items were culturally appropriate and easy to understand.
Data Analysis
In alignment with the rational-empirical strategy of test construction (Butcher, 2000; Pekrun et al., 2004; Schwartz, 1978), theory was implemented to aid the design of the revised AEQ-T, followed by an empirical analysis of the psychometric properties. To empirically examine the revised AEQ-T, the instrument was tested for internal consistency first, and then investigated using exploratory factor analysis (EFA) with the Japanese sample. After initially developing the instrument, it was validated with the Korean sample using confirmatory factor analysis (CFA). Also, convergent validity was tested using correlations with Teachers’ Sense of Self-Efficacy Scale (TSES) and Teacher Career Satisfaction Survey (TCSS). CFA was performed using AMOS and the remaining statistical analyses were performed using SPSS.

Results

Internal Consistency
First, we examined reliability estimates of the revised AEQ-T that includes five emotions for both countries. For the Japanese sample, four emotions showed acceptable level of internal consistency with alpha coefficients of .85 (anxiety), .79 (pride), .78 (enjoyment), and .71 (anger). One anger item (“I often feel annoyed while teaching.”) was deleted, as alpha coefficient was increased when the item was deleted. The Korean sample also showed acceptable level of internal consistency for the four emotions: .72 (anxiety), .76 (pride), .72 (enjoyment), and .78 (anger). Again, the same item from anger was deleted, as it lowered reliability. For both countries, frustration items showed low reliability ($r = .41$ for Japanese sample, $r = .63$ for Korean sample).

Exploratory Factor Analysis for Japanese Sample
Using the revised AEQ-T that has 20 items with five emotions, a series of exploratory factor analysis (EFA) were performed on Japanese sample. EFA was used as it can determine the number of factors and identify the items
that have cross-loadings or misloadings in other factors. A principal axis factor analysis with promax rotation was used. The initial run resulted in a five-factor solution, but the scree plot provided evidence for four-factor solution, and the five items either failed to load substantially on one factor, or loaded strongly on two factors. Three frustration items were cross-loaded with anger items; one frustration item was not loaded in any factor substantially. Also, one anger item (“I often feel annoyed while teaching.”) that lowered reliability was cross-loaded. We deleted those five items and attempted to derive a new solution based on the remaining 15 items. The second run resulted in a clear four-factor solution based on an examination of the scree plot and eigenvalues. The four factors have eigenvalues of more than 1 and accounted for 66.90% of the total variance. The EFA results on factor loading for each item and Cronbach’s α coefficient for each sub-scale after removing the five items are presented in Table 1.

Table 1
*Exploratory Factor Analysis Results for Factor Loading on the Revised AEQ-T Scale (Japanese Sample)*

<table>
<thead>
<tr>
<th>Sub-scale and Item</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anxiety</strong> Cronbach’s α = .85</td>
<td></td>
</tr>
<tr>
<td>Preparing to teach often causes me to worry.</td>
<td>.958</td>
</tr>
<tr>
<td>I feel uneasy when I think about teaching.</td>
<td>.879</td>
</tr>
<tr>
<td>I generally feel tense and nervous while teaching.</td>
<td>.754</td>
</tr>
<tr>
<td>I am often worried that my teaching isn’t going so well.</td>
<td>.667</td>
</tr>
<tr>
<td><strong>Pride</strong> Cronbach’s α = .79</td>
<td></td>
</tr>
<tr>
<td>I feel proud of the way I prepare for my teaching.</td>
<td>.804</td>
</tr>
<tr>
<td>I get a feeling of pride as a result of my work.</td>
<td>.790</td>
</tr>
<tr>
<td>I am proud of the way I am teaching.</td>
<td>.734</td>
</tr>
<tr>
<td>Thinking about my success as a teacher makes me feel proud.</td>
<td>.729</td>
</tr>
<tr>
<td><strong>Enjoyment</strong> Cronbach’s α = .78</td>
<td></td>
</tr>
<tr>
<td>I often have reasons to be happy while I teach.</td>
<td>.805</td>
</tr>
<tr>
<td>I generally have fun preparing my lessons.</td>
<td>.788</td>
</tr>
<tr>
<td>I generally enjoy teaching.</td>
<td>.786</td>
</tr>
<tr>
<td>I generally teach with enthusiasm.</td>
<td>.438</td>
</tr>
</tbody>
</table>
Note: Factor loadings less than .3 were not shown in the table.

### Convergent Validity for Japanese Sample

We tested concurrent validation processes where the new scale is correlated with other scales that are posited to have certain relationships. Such relationships are addressed next.

**Teachers’ sense of efficacy.** Teachers’ Sense of Efficacy Scale (TSES) developed by Tschannen-Moran and Hoy (2001) and revised by Ruan and her colleagues (2015) for Asian samples was used to test convergent validity. A positive relationship was predicted between scores on the TSES and positive emotions of enjoyment and pride from the revised AEQ-T. Also, a negative relationship was predicted between the TSES and negative emotions of anger and anxiety. As shown in Table 2, both predictions were confirmed.

**Teachers’ career satisfaction.** Teachers’ Career Satisfaction Survey (TCSS) developed by the International Association for the Evaluation of Educational Achievement (2011) and tested for Asian samples (Ruan et al., 2015) was used. A positive relationship was predicted between scores on the TCSS and positive emotions of enjoyment and pride from the revised AEQ-T. Also, a negative relationship was predicted between the TCSS and negative emotions of anger and anxiety. Table 2 also shows that the predictions were confirmed.
Table 2
Convergent Validity (Japanese Sample)

<table>
<thead>
<tr>
<th></th>
<th>Teachers’ Career Satisfaction</th>
<th>Teachers’ Sense of Self-Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>-.340**</td>
<td>-.526**</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>.547**</td>
<td>.255**</td>
</tr>
<tr>
<td>Pride</td>
<td>.545**</td>
<td>.538**</td>
</tr>
<tr>
<td>Anger</td>
<td>-.141*</td>
<td>-.332**</td>
</tr>
</tbody>
</table>

Note: **p<.01, * p<.05

Cross-Validation with Korean Sample

The 15-item version of AEQ-T was further cross-validated with Korean sample. The Confirmatory Factor Analysis (CFA) was used to test the fit between the EFA-derived factors and items in an independent sample of Korean teachers. The four-factor model provided a good data-model fit, $X^2=145.7, df=79, p<.001$, TLI=.900, CFI=.934, RMSEA=.064. The CFA results on factor loading for each item and Cronbach’s α coefficient for each sub-scale are presented in Table 3.

Table 3
Confirmatory Factor Analysis Results for Factor Loading on the Revised AEQ-T Scale (Korean Sample)

<table>
<thead>
<tr>
<th>Sub-scale and Item</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anxiety</strong></td>
<td></td>
</tr>
<tr>
<td>Preparing to teach often causes me to worry.</td>
<td>.515</td>
</tr>
<tr>
<td>I feel uneasy when I think about teaching.</td>
<td>.805</td>
</tr>
<tr>
<td>I generally feel tense and nervous while teaching.</td>
<td>.610</td>
</tr>
<tr>
<td>I am often worried that my teaching isn’t going so well.</td>
<td>.421</td>
</tr>
<tr>
<td><strong>Pride</strong></td>
<td></td>
</tr>
<tr>
<td>I feel proud of the way I prepare for my teaching.</td>
<td>.616</td>
</tr>
<tr>
<td>I get a feeling of pride as a result of my work.</td>
<td>.784</td>
</tr>
<tr>
<td>I am proud of the way I am teaching.</td>
<td>.530</td>
</tr>
<tr>
<td>Thinking about my success as a teacher makes me feel proud.</td>
<td>.665</td>
</tr>
<tr>
<td><strong>Enjoyment</strong></td>
<td></td>
</tr>
<tr>
<td>I often have reasons to be happy while I teach.</td>
<td>.422</td>
</tr>
</tbody>
</table>
Table 3. Continued

<table>
<thead>
<tr>
<th>Sub-scale and Item</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>I generally enjoy teaching.</td>
<td>.774</td>
</tr>
<tr>
<td>I generally have fun preparing my lessons.</td>
<td>.679</td>
</tr>
<tr>
<td>I generally teach with enthusiasm.</td>
<td>.581</td>
</tr>
</tbody>
</table>

**Anger**  Cronbach’s α = .78

<table>
<thead>
<tr>
<th>Sub-scale and Item</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sometimes I get really mad while I teach.</td>
<td>.834</td>
</tr>
<tr>
<td>I often have reasons to be angry while I teach.</td>
<td>.806</td>
</tr>
<tr>
<td>Some days teaching just infuriates me.</td>
<td>.556</td>
</tr>
</tbody>
</table>

*Note:* Factor loadings less than .3 were not shown in the table.

The same convergent validity tests were performed on Korean sample. As expected, both Teachers’ Sense of Efficacy Scale (TSES) and Teachers’ Career Satisfaction Survey (TCSS) were positively correlated with positive emotions of enjoyment and pride, and negatively correlated with anger and anxiety. The correlation results are presented in Table 4.

Table 4

<table>
<thead>
<tr>
<th>Convergent Validity (Korean Sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers’ Career Satisfaction</td>
</tr>
<tr>
<td>Anxiety</td>
</tr>
<tr>
<td>Enjoyment</td>
</tr>
<tr>
<td>Pride</td>
</tr>
<tr>
<td>Anger</td>
</tr>
</tbody>
</table>

*Note:* **p<.01

**Discussion**

The findings of this study contribute to the field by providing empirical evidences that the three emotions included in the original AEQ-T (enjoyment, anger, and anxiety) are replicated with Asian teachers. Also, another positive emotion, pride, needs to be added to measure discrete emotions of teachers more comprehensively.

However, unlike our prediction, frustration did not demonstrate good internal consistency and did not emerge as a factor. The fact that most of the frustration items were cross-loaded with anger items suggests the need to
further investigate the nature of frustration and anger, and the differences between the two. Despite the theoretical distinction between frustration and anger and Sutton’s (2004) empirical data, her other study (Sutton, 2007) also showed that teachers experienced frustration and anger simultaneously for 17% of the episodes they reported. Also, the teachers reported no significant difference between frustration and anger in terms of bodily responses, intrusive thoughts, and coping strategies. This indicates the inconsistent findings and lack of empirical evidences to distinguish anger and frustration. As we discussed earlier, theoretical rationale cannot hold its truth and validity without empirical evidences. Thus, future research needs to further explore how teachers perceive and experience frustration and anger, and what the similarities and differences are between the two.

Also, it is important to note that anger can turn into frustration, as the teacher realizes low controllability after repeated failure to change or improve the situation (Chang, 2009). Given the fact that one incident can invoke both anger and frustration depending on how the teachers exercises agency, frustration items need to focus on the controllability aspect. Currently, frustration items were not worded in a way to capture these key features of circumstance-caused challenges and low controllability. Items were targeted to measure general frustration experience without emphasizing the key nature of frustration (e.g., “Teaching generally frustrates me.”, “I often feel frustrated while working with students.”). Frustration items need to be better worded in a way to include those distinctive aspects of frustration (e.g., “Teaching generally frustrates me, as I cannot control certain aspect of teaching.” or “I often feel frustrated when I repeatedly fail at achieving my goals.”). Future research needs to revise frustration items and test them empirically.

One of the major contributions of this study is to provide empirical evidence to include pride in measuring teachers’ discrete emotions. Pride has been recognized as a universal and distinctive emotion observed in various cultures and environments (Tracy & Robins, 2004, 2007). In particular, several studies have shown that pride is a highly relevant emotion that teachers experience frequently (e.g., Becker, 2011; Carson, 2007; Frenzel, 2014). Carson’s (2006) study found that pride is the second most frequent emotion, as students’ progress and accomplishments often result in teachers’
feelings of pride (Keller, Frenzel, Goetz, Pekrun, & Hensley, 2014). Pride also functions to increase self-esteem and adaptive behaviors, and promotes an individual’s social status and group acceptance (Hart & Matsuba, 2007; Leary, Tambor, Terdal, & Downs, 1995). Thus, pride is an important emotion especially for novice teachers who are in the critical stage of developing a sense of teacher identity and belonging to the professional community. As we addressed previously, pride is elicited when teachers make internal, unstable, and controllable attribution beliefs on positive outcomes such as students’ learning, achievement, or prosocial behaviors (Lewis, 2000; Smith & Lazarus, 1993; Weiner, 1985). This implies that it is important for school leaders and colleague teachers to provide concrete feedback on the teachers’ instructional and interpersonal effort, so that teachers experience pride emotion, and develop self-representations and stronger sense of competence.

Despite this salience and importance of pride in teachers’ emotions, the existing AEQ-T measure did not include pride. Indeed, our findings suggest that pride is a useful teacher emotion to measure in the classroom, which is in alignment with previous research (Trigwell, 2012; Trigwell & Prosser, 2004). Moving forward, we recommend that researchers include pride when assessing teacher emotions. Furthermore, teacher pride is a fruitful area of future research because few studies have explored this emotion in depth as it occurs in the classroom (Golby 1996; Trigwell & Prosser, 2004). Finally, given our conclusion that pride should be included when assessing teacher emotions, we suggest exploring the prevalence of other related teacher emotions such as hope, hopelessness, shame, and guilt.

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Essentials of Human Memory

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Review


Alan Baddeley, a psychologist from the University of York, well known for his research focused on the working memory, invites us to know the most relevant scientific knowledge on learning and human memory in this rigorous work from an easy to understand approach.

He begins showing us how different authors have described memory throughout history: William James in 1890 or Donal Hebb in 1949 had already proposed that the human memory consisted of a system formed by sub-components. In 1968, Atkinson and Shiffrin presented *The modal model*, a memory system with 3 different components: sensory registers (visual, auditory or haptic), short-term memory (STM) and long-term memory (LTM). Derived from an experiment aimed at showing the defects of STM, Graham Hitch and Baddeley (1974) proposed that working memory had three components: central executive, phonological loop and visual-spatial sketch pad. On the other hand, in 1972, Tulving proposed two different types of long-term memory: semantic and episodic. After that, in 1984, Hudson led a research carried out with children that revealed that the development of both types of LTM was produced interactively.

The author also talks about the two main paradigms in which the research on human memory has been focused on for the last 100 years. The first one, which was initiated by Ebbinghaus, is characterized by very simple memory tasks and well-controlled conditions. The second one, which was introduced by Barlett, appeared to refute the previous paradigm, and it is characterized by using rich and meaningful materials in memory tasks, such as stories and pictures, under natural conditions. This last approach derived in studies as the one led by Luria with Shereshevskii, a mnemonist.
Furthermore, Baddeley explains processes such as forgetting, which is represented by the *forgetting curve* (Ebbinghaus, 1885), or the concept of *repression*, which was introduced by Freud and refers to forgetting painful memories.

Baddeley also discusses memory from a perspective of age. On the one hand, he explains the childhood memory, focusing on episodic memory and showing, through different studies, how the child’s autobiographical memories evidence that they learn explicitly. Moreover, the book presents scientific evidence from the research on memory and ageing, showing that there is deterioration in working memory and long–term memory, among others, whereas the vocabulary improves the older a person is. Within the same chapter, the author provides an extensive explanation of Alzheimer’s disease.

The author also explains different types of amnesia giving examples that define its causes and explains that people with amnesia can continue learning as the famous patient H.M.

The importance of this book for educational psychology lies in the fact that the author makes reference to the learning process all time throughout the book, giving us information to be taken into consideration, both to investigate in learning in educational psychology and to translate such memory research into the practice of instruction. Some of the most remarkable messages in this regard can be summarized as follows: The scientific study of memory and learning starts in 1880 by the hand of Ebbinghaus, who demonstrated that it was possible to study the human memory from an empiric paradigm through his own learning. He discovered the *Total Time Hypothesis*, on which the human learning is based. From a neurophysiological approach, memory and learning processes produce a sequence of changes in the brain of electrophysiological and neurochemical nature. For example, Eric Kandel (2006) showed this in some simple learning processes such as habituation, sensitisation and classical conditioning, in Aplysia, a marine organism. In more complex aspects of learning, the long-term potentiation (LTP), a mechanism where they are involved cells related to learning and memory has been proposed. Some evidence has demonstrated that the phonological process, memory and learning to read are connected. It means that memory development is involved in educational processes.
At the end of the book, Baddeley gives us his prospective about future research interests on human memory and explains how the study of memory is becoming interdisciplinary, how cognitive psychologists are beginning to work with colleagues from other fields such as neurology, neuroradiology, clinical medicine and social psychology, among others, and he predicts that the study of memory will continue to be active.

References


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