



Personalised Learning-Technology Interface at Secondary Education

Vetti Giri¹, M U Paily², Annamaneni Rohith³

Department of Education, Regional Institute of Education (NCERT), Mysuru – 570006

Abstract : *‘Personalised Learning’ recognises that the quality of learning is shaped by learners’ experiences, characteristics, interests and aspirations. High quality teaching explicitly builds on learner needs – as well as on high expectations and good subject knowledge (Johnson, 2004). While the concept of personalized learning has been around for some time, advances in technology and digital content have placed personalized learning within reach for an increasing number of schools. At this background, in the present study, the investigator studied the practices of teachers pertaining to ‘Personalised Learning – Technology Interface’ through survey method, by employing a tool ‘Technology Mediated Personalised Learning Inventory’ (TMPLI), its Cronbach’s Alpha value is 0.929. Descriptive statistics indicate that 68% of scores of learner profile, personalised learning paths, competency-based learning model, flexible learning environment, college and career readiness lie between the range of 27.03 - 36.75, 28.48 - 37.37, 26.57 – 36.63, 24.53 – 35.29, and 25.33 – 35.21 respectively. Pearson correlation method was employed to find out the correlation between awareness of Personalised learning among teachers and the integration of technology to facilitate Personalised learning, and results shows that correlation is highly significant at 0.01 level. Correlation for each component of Personalised learning are Learner profile - 0.476**, Personal learning paths – 0.283**, Competency based learning – 0.325**, Flexible learning environments – 0.596**, College and career readiness – 0.413**. The data was obtained from teachers of different schools like Kendhriya Vidyalaya, Jawahar Navodaya Vidyalas and other CBSE schools.*

Key words: Personalised Learning, technology, personal learning paths, learner profiles, flexible learning environment.

Introduction

According to Dewey (1997) who noted that teachers are

“concerned with providing conditions so adapted to individual needs and powers as to make for the permanent improvement of observation, suggestion, and investigation”,

the importance of personalised learning has been recognised in research and practice. Dewey also said “If we teach today’s students as we taught yesterday’s, we rob them of tomorrow.” He wrote this nearly a century ago, it would have been inconceivable for him to imagine the present digital world with electronic resources, digital textbooks, instructional games, interactive blogs, and social media. Yet his spirit of the message remains highly relevant even today. If school education doesn’t re-invent itself to engage students for what & how they want to learn, it will be difficult for India to compete in the global economy. Mark Schneiderman, the senior director of education policy for the Software & Information Industry Association, spoke at a recent education symposium and said that “the factory model that we’ve used to meet the needs of the average student in a mass production way for years is no longer meeting the needs of each student.” (West, 2011)

21st Century see schools where students master their skills in a personalized and collaborative learning environment, there is a considerable need for schools to rethink their pedagogy. “In simple terms, Personalised learning is the route to raise quality and equity in our education system.” ‘Personalised Learning’ recognises that the quality of learning is shaped by learners’ experiences, characteristics, interests and aspirations. High quality teaching explicitly builds on learner needs – as well as on high expectations and good subject knowledge (Johnson, 2004). Personalised learning, furthermore, consists of differentiation and individualisation (U.S. Department of Education 2010). Whilst differentiation focuses to customise the method of teaching in tune with the learners’ sensibilities, individualisation enables learners to learn in their own pace, skipping or repeating topics if necessary. Learning goals, however, always stay the same. The adoption of these approaches has significantly increased over the past several years, in part driven by rapid advances in technology platforms and digital content (Rand Corporation, 2014).

Table 1: Tabular representation of different aspects of personalised learning.



Personalised learning	
Educational philosophy	Child centered learning, Constructivism.
Dimensions	Personalising the content, & Personalising the content.
Components	Learner profile, Personalised learning paths, Competency-based learning model, Flexible learning environment, College and career readiness.
Pedagogy	Flipped classroom learning, Micro-learning, Immersive problem solving, Self-regulated journaling, Authentic learning, and Collaborative learning.
Digital Learning tasks	Tagging, Annoting, Hacking, Twittering, Book marking, Interactive simulations, Blog journaling, Programming, Filming, Podcasting, Video casting, Mind mapping, concept mapping, subject based online games, Wikiing, Sharing and Mashing.

Rand Corporation, (2014) summarized five components of personalised learning they are

- **Learner profiles:**A key personalized learning strategy is using data— specifically, data from multiple sources, such as tests, quizzes, or projects as well as non-achievement data and learning goals—to understand student progress and inform development of personalized learning goals that are discussed with each student.
- **Personal learning paths:** Personal learning paths are a central personalized learning strategy, and a key element of this strategy is providing students with flexible and multiple paths through content. One way to provide flexibility is to allow students to make choices about their learning.
- **Competency-based model:**In a competency-based model, students are placed with content that is appropriate to their learning level and are supported to work at their own pace, so they can take the time they need to fully understand the material.
- **Flexible learning environments:** Another key attribute of personalization is the extent to which the learning environment is flexible and responsive to student needs, and resources such as staff, space, and time are used in flexible ways to support personalization.
- **College and Career Readiness:**Practices that promote college and career readiness are generally viewed as an important component of personalized learning. Two key aspects of college and career readiness are (1) developing the non-academic skills and competencies, such as resilience and self-reliance, which likely contribute to postsecondary success and (2) developing college and career preparation skills, such as planning which courses to take in high school or understanding colleges’ admissions requirements.

In recent years, the importance of e-learning has increased leading to a convergence of technological and pedagogical innovation aiming for educational goals supported by technology (Garrison 2011).

The Government of India seeks to strengthen the use of ICT in almost every sphere. To promote the use of ICT in school education the Government of India had introduced ICT@ Schools scheme in the year 2004 by merging the scheme of Educational Technology -1972 and Computer Literacy and Studies in Secondary Schools (CLASS)-1984. The scheme was revised in the year 2010 and 2011 and a component to develop quality digital contents and incentives for teachers (National ICT Award for School Teachers) was introduced. Under the Teacher Education plan, ICT infrastructure are also being provided to the Teacher Education Institutions (TEIs) i.e. National Council of Educational Research & Training (NCERT), State Council of Educational Research & Training (SCERT), District Institute of Educational Training (DIET), etc.

Relevant use of technology will help to effectively solve India’s problem of providing quality education and development of skilled human resources. ICT needs to be used to provide high quality education, as well as, holistic education to each child including children and youth with special needs and marginalized sections of the society. The schools and TEIs require a robust, reliable ICT infrastructure in order to effectively integrate ICT into all aspects of school life and that of TEIs including teaching, learning and evaluation.

A variety of digital learning resources including audios, videos, interactive, multi-media digital charts, maps, timelines, digital books, on-line labs activities, virtual and augmented learning resources are being developed and are being used

to enhance teaching learning process in schools. SWAYAM PRABHA direct to home TV channels are launched to telecast exclusively education programmes.

Despite the changing landscape of personalised learning in school education, there is no much research of it in India. Learners have to be encouraged as well as prepared for personalisation, as it requires profound knowledge about their learning preferences (i.e. metacognition) as well as digital literacy. Hence the present study is aimed to study the teacher behaviours of personalised learning in teaching learning process. And also, to explore the relationship between behaviours of personalised learning and technology integrated personalised learning.

Research sketch on personalised learning

Two University of Chicago doctoral students in education, Anania (1982, 1983) and Burke (1984), completed dissertations in which compared student learning under the following three conditions of instruction:

1. *Conventional*. Students learn subject matter in a class with about 30 students per teacher. Tests are given periodically for marking the students.
2. *Mastery Learning*. Students learn the subject matter in a class with 30 students per teacher. The instruction is the same as in the conventional class (usually with the same teacher). Formative tests (the same tests used with the conventional group) are given for feedback followed by corrective procedures and parallel formative tests to determine the extent to which the students have mastered the subject matter.
3. *Tutoring*. Students learn the subject matter with a good tutor for each student (or for two or three students simultaneously). This tutoring instruction is followed periodically by formative tests, feedback-corrective procedures, and parallel formative tests as in the mastery learning classes. It should be pointed out that the need for corrective work under tutoring is very small.

The Anania (1982, 1983) and Burke (1984) studies comparing student learning under one-to-one tutoring, mastery learning and conventional group instruction began in 1980. As the results of these separate studies at different grade levels and in different school subjects began to emerge, the findings indicated that one-on-one tutorial, is two deviations higher than conventional group in student cognitive achievement, attitudes, and academic self-concept.

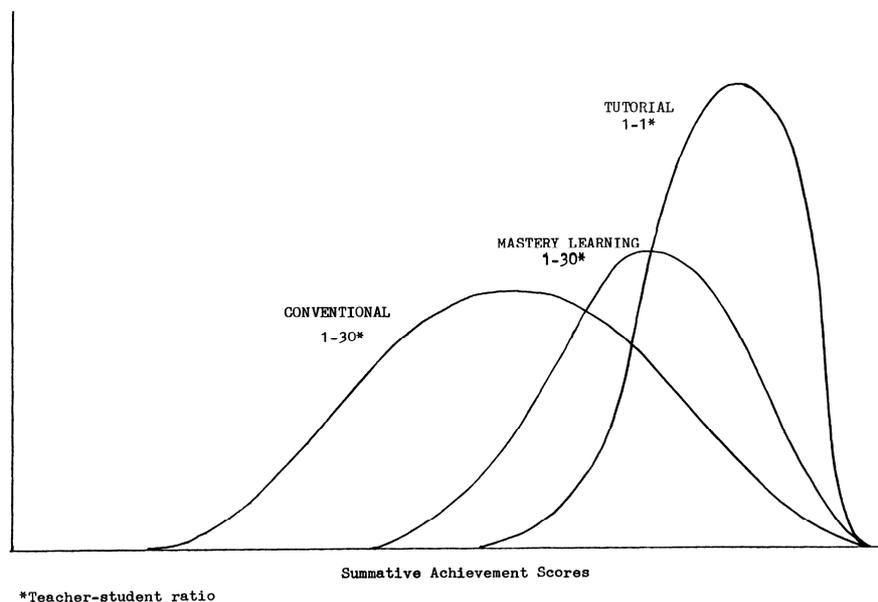


Figure 1. Achievement distribution for students under conventional, mastery learning, tutorial instruction, Anania (1982, 1983) and Burke (1984).

Students are more likely to engage and find learning meaningful if they have some ownership of their learning and the learning environment, students require some opportunities for their learning to be personalised, thus ensuring that the particular strengths, needs and interests of each student are best met and students require opportunities to contribute to their learning, to make ideas and to offer suggestions that are factored in legitimately as part of the teaching and learning (Bandura, 1997).

Green, Facer, Rudd, Dillon and Humphreys (2005) summarise four key areas pivotal to enabling personalised learning through digital technologies. According to them, pedagogy must:

- ensure that learners are capable of making informed educational decisions;
- diversify and recognise different forms of skills and knowledge;



- create diverse learning environments; and
- include learner focused forms of feedback and assessment

Brusilovsky, Kobas, & Nejdil (2007) suggest that students would not suffer from information overload, if they were presented with Personalised learning activities. Information overload is a concern due to the easy access to an abundance of online information sources. The proliferation of existing digital technologies, and the prospect of what could be created, provides outstanding possibilities for personalising education—be it with audio playback of a learner's tone and pronunciation that can be played back on a portable MP3 player as a he or she continues to improve their verbal reading skills, or a customised set of simulations for a given learner, based on their performance on an online questionnaire designed to test their existing conceptions of science concepts. Likewise, this personalisation effect is also possible in the area of assessments, which can also be more sophisticated as a result new advances in ICT-based assessments (Blamire, R., 2009).

Relevance and implications of technology and technology-based school innovations (OECD, 2010):

- Technology can perform several key functions in the change process, including opening up new opportunities that improve teaching and learning—particularly with the affordance of customisation of learning to individual learner needs, which is highly supported by the learning sciences;
- Technology is an integral part to accessing the higher-order competencies often referred to as 21st Century Skills, which are also necessary to be productive in today 's society.

Jung & Latchem (2011), suggest that information and communications technology (ICT), can facilitate active learning to suit the individual learning requirements of students. National Survey Shows Strong Parent Support for Technology in the Classroom; Suggests Gaps and Opportunities in Implementation. 93 percentage of parents believe in the use of technology to tailor student learning, yet only 1 in 3 say that schools are doing an excellent job using technology for this purpose (Immediate et al., 2016). Thus, In learning environments where a menu of digital technologies is made available and is properly supported by teachers and learning facilitators, the classroom becomes a flexible learning environment that is able to adapt and conform to the needs, goals and motivations of each student. It goes without saying that no technology can replace a teacher, however digital technologies can be powerful tools to help teachers do their jobs, in a more effective and personalised way.

Methodology

Teachers play an integral role in facilitating personalised learning by designing and managing the learning environment, leading instruction, and providing students with expert guidance and support to help them take increasing ownership of their learning. So as to understand the personalised learning and technology interface at secondary schools, a survey was administered to teachers of different schools such as Kendhriya Vidyalayas, Jawahar Navodaya Vidyalayas, private public schools and the sample size is 129 trained graduate teachers of all subjects. The study schools are predominantly located in urban areas and tend to serve large proportions of varied socio-economical students ranging from high socio-economical background to low. More than half of the sample of present study is drawn from Kendhriya Vidyalayas which are considered to be premiere central government schools of India.

Before administering the tool the investigator briefed the participants about the purpose and different aspects of tool, this asked teachers to provide their opinions about various aspects of personalised learning, including professional training and support, access to resources, the quality of instructional and curricular materials, use of different strategies of classroom instruction, use of technology in the classroom, use of data to assess student progress, and obstacles to implementation. The researcher randomly picked some teachers, and conducted un structured interviews to explore the different practices that they are practicing regarding personalised learning. The researcher also further interviewed to explore the obstacles in facilitating personalised learning in schools.

Technology Mediated Personalised Learning Inventory (TMPLI)

This tool was constructed by investigator based on five components of Personalised learning they are learner profiles, personal learning paths, competency – based learning models, flexible learning environments, college and career readiness, for each component of personalised learning eight items were constructed, four pertaining to personalised learning, and the other four technology mediated personalised learning, as a result this tool comprises of forty items for all five components of personalised learning. All statements carry a rating scale, ranging *always, often, sometimes, rarely, never* and carry 5, 4, 3, 2, & 1 weightages respectively. The tool was validated with subject and language experts. The reliability was established with 129 sample size, Cronbach's Alpha value is 0.929, which is highly significant.

Results

Teachers show almost similar competency across all five components of personalised learning.

Table 2: Mean scores of teachers in facilitating personalised learning. (N = 129)

Components	Mean	Std.Deviation
Learner profile	31.89	4.86
Personalised learning Path	32.90	4.47
Competency based learning model	31.60	5.03
Flexible learning Environment	29.91	5.38
College & career readiness	30.27	4.94

From the table 2, it is observed that 68% of scores of learner profile, personalised learning paths, competency-based learning model, flexible learning environment, college and career readiness lie between the range of 27.03 - 36.75, 28.48 - 37.37, 26.57 – 36.63, 24.53 – 35.29, and 25.33 – 35.21 respectively. So, majority of the participants scores are higher than mean of the test. And, it's also evident that participants scored comparatively less in flexible learning environment component.

Correlation between behaviours of personalised learning and technology integrated personalised learning among secondary teachers.

Table 3: Correlation between behaviours of personalised learning and technology integrated personalised learning (N = 129)

Correlation between Personalised learning & Technology mediated Personalised learning	
Component	Coefficient
Learner profile	.476**
Personalised learning paths	.283**
Competency-based model	.325**
Flexible learning environments	.596**
College and Career Readiness	.413**
Note: **Correlation significant at 0.01 level	

The data of table 3, indicates that there is a significant correlation between personalised learning and technology mediated personalised learning among teachers attended to this study at 0.01 level. This correlation means that teachers those who have knowledge of personalised learning equally employing technology in teaching learning process. Pearson correlation method was employed to find out the correlation. The correlation values between personalised learning and technology mediated personalised learning are furnished in the table 3.

Discussion

While the international school systems rapidly transform to provide good working models of personalised learning as shown in Table 4, teachers and teacher educators need to be equipped with skills and guidelines that can be applied in diverse contexts. What role should technologies play in this process? Jonassen (1994) maintains that the real challenge facing educational technologists is to consider instructional goals in a particular context, then to adjust the strategies, models and tactics as necessary to attune the nature of the task to the perspective of the student.

Table 4: An illustration of Personalised Learning in Science

Topic	Context	Personalisation
Flower	Students studying seventh class visit the ‘flower show’ Regional Institute of Education, Mysuru, where they take photos of different using mobile phones, upload them to <i>Flickr</i> , and use the site’s tools to tag, annotate and write descriptions and comments about the photos.	Personalisation and tailoring of tasks ensures that students remain motivated, i.e. they have a personal voice in making commentaries and in choosing descriptors to tag the photos. Peer to peer content sharing adds a collaborative dimension while still allowing individual reflection and achievement.

Percentage of Teachers in Facilitating Personalised Learning

Table 5: is about the analysis of teacher responses with respect to how frequent they facilitate personalised learning and technology mediated personalised learning. Teachers reported widespread use of learner profile, personalised learning paths, and competency-based instructional practices. The data indicates that teachers are not practicing the college and career readiness activities well as compare to other four components of personalised learning. Large majorities of teachers agreed that instructional practice reflects a wide variety of characteristics related to competency-based learning, which is instructional practices that require students to demonstrate an adequate level of mastery of specific skills or knowledge before advancing to new content. Only 10.9 percent of teachers reported that they never clearly presented objectives for assignments, devised strategies to allow students to track their own progress, and allowed different students to work on different topics or skills at the same time.

Table 5: Percentage of Teachers in Facilitating Personalised Learning	
Learning profile	58.9 % of teachers reported that they always provide frequent information regarding child’s academic progress and areas for growth.
	29.5% teachers reported that they always evaluate portfolio to enhance learning goals of student.
	18.6% teachers reported that they rarely use multiple sources of data, such as tests, quizzes, projects, to understand student’s progress.
	10.9% teachers reported that they never use technology to manage record work like tracking attendance, and assignment submission etc.
Personal learning paths	55% teachers reported that they always adapt instruction and schoolwork to meet child’s individual needs and strengths.
	20.3% teachers reported that they sometimes tailor learning experiences to students’ individual needs and strengths.
	7.0% teachers reported that they never use technology to measure students’ individual learning needs and then deliver targeted instruction similar to one on one.
	24.8% teachers reported that they always use technology to facilitate multidisciplinary learning platform for collaborative projects.
Competency-based learning	8% teachers reported that they never allow child to work and learn at a pace that is right for him/her.
	48.8% teachers reported that they always assign appropriate learning tasks to their learning level.
	Only 16.3% teachers reported that they always use technology to identify accurate skill gaps and provide students real-time assessment data.
	Only 19.4% teachers reported that they always use technology to focus much on competencies rather credentials.
Flexible learning environments	27.1% teachers reported that they always leverage technology in teaching that is adaptive, accessible, and cost effective.
	45% teachers reported that they often use technology to support learning anytime and anyplace (life-long and life-wide learning).
	20% teachers reported that they always use technology to transcend the classroom experience with virtual reality and augmented reality
	Only 16.3% teachers reported that they always use technology to shrink current distinctions such as

College and career readiness	“informal” vs. “formal” learning.
	Only 24.8% teachers reported that they always foster non-academic competencies of students such as resilience when my students are low.
	Only 19.4% teachers reported that they always suggest some online courses to better career choices of students.
	30.2% teachers reported that they sometimes use technology to facilitate immersive problem-based learning to foster real-time decision-making ability of the learner.
	7% teachers reported that they never suggest online courses to better career choices of students.

The present study indicates that strategies to personalized learning vary, but common practices emerged. Teachers responded that they facilitate personalised learning of all components including learner profile, personalised learning paths, competency-based learning model, flexible learning environment, college and career readiness. The teachers participated in the study scored the mean of 31.89, 32.90, 31.60, 29.91, 30.27 across learner profile, personalised learning paths, competency-based learning model, flexible learning environment, college and career readiness respectively. So, the data indicates that teachers participated in the study have quite good understanding of various aspects of personalised learning.

The present study is delimited by the small sample size of 129. Thus, its high time to create sufficient infrastructure required for facilitating personalised learning.

Conclusion

The current paper provides an understanding of personalised learning among secondary teachers, teachers behaviour of personalised learning across five components of it including learner profile, personalised learning paths, competency-based learning model, flexible learning environment, college and career readiness was studied systematically. The items of inventory majorly focused on personalised learning spaces, strategies, assessment practices, resources, environments and its associated technology. From the table 2, it is observed that 68% of scores of learner profile, personalised learning paths, competency-based learning model, flexible learning environment, college and career readiness lie between the range of 27.03 - 36.75, 28.48 - 37.37, 26.57 – 36.63, 24.53 – 35.29, and 25.33 – 35.21 respectively. So, majority of the participants scores are higher than mean of the test. The data of table 3, indicates that there is a significant correlation between personalised learning and technology mediated personalised learning among teachers attended to this study at 0.01 level.

Implications for researchers include the improvement of the experimental procedure such as sampling size, and a greater focus on implementation and infrastructure aspect of personalised learning. Personalised learning allow learners to make decisions about how to choose tools and configure the learning environment to best suit their learning goals and needs for networking, knowledge construction, social interaction and collaboration. In addition, personalised learning challenge traditional pedagogies. All in all, addressing the need to rethink and reposition pedagogy for the new learning ecosystem of the 21st century calls for the active involvement of students in defining their learning goals and choosing both ICT tools and strategies for learning. There is a fine balance to be achieved in attempting to promote learner autonomy, knowledge creation, by offering flexible options and choice, whilst offering guidance and structure when needed and adding value to the learning process through personalised, customised and adaptive approaches.

References

Anania, J. (1982). The effects of quality of instruction on cognitive and affective learning of students. (Doctoral dissertation, University of Chicago, 1981). Dissertation Abstracts International, 42, 4269A.

Anania, J. (1983). “The influence of instructional conditions on student learning environment.” Evaluation in Education: An International Review Series, 7,1, 1-92.

Burke, A.J. (1984). Students’ potential for learning contrasted under tutorial and group approaches to instruction. Dissertation Abstracts International, 44, 2025A.

Bandura, A 1997, Self efficacy: The exercise of control, WH Freeman, New York

Blamire, R. (2009). ICT Impact Data at Primary School Level: the STEPS approach. In Scheuermann, F., & Pedro, F. (eds.), Assessing the effects of ICT in education, 199-211. European Union/OECD: France.

Dewey J (1997) How We Think, Dover Publications, Mineola, USA



- CentreBrusilovsky, P., Karagiannidis, C., & Sampson, D. (2004). Layered evaluation of adaptive learning systems. *International Journal of Continuing Engineering Education and Lifelong Learning*, 14(4/5), 402–421. doi:10.1504/IJCEELL.2004.005729
- Cheung, K., Lam, J., Szeto, R., & Yau, J. (2008). Exploring a pedagogy-driven approach to e-courses development. Paper presented at the 2008 IEEE International Workshop on Education Technology and Training & 2008 International Workshop on Geoscience and Remote Sensing. doi:10.1109/ET-TandGRS.2008.267
- Driver, R., Asoko, H., Leach, J., Mortimer, E. & Scott, P. (1994). Constructing scientific knowledge in the classroom. *Educational Researcher*, 23(7), 5-12.
- Garrison DR (2011) *E-learning in the 21st Century. A Framework for Research and Practice*. 2nd ed. Routledge, New York, USA
- Green, H., Facer, K., Rudd, T., Dillon, P., & Humphreys, P. (2005). *Personalisation and Digital Technologies*. A Futurelab report.
- Immediate, F. O. R., October, R., Assembly, T. L., Lockett, P., Innovations, L., Assembly, L., ... Promise, D. (2016). *National Survey Shows Strong Parent Support for Technology in the Classroom ; Suggests Gaps and Opportunities in Implementation*
- Immediate, F. O. R., October, R., Assembly, T. L., Lockett, P., Innovations, L., Assembly, L., ... Promise, D. (2016). *National Survey Shows Strong Parent Support for Technology in the Classroom ; Suggests Gaps and Opportunities in Implementation*.
- Johnson, M. (2004). *Personalised Learning*. *New Economy* (Vol. 11). <https://doi.org/10.1111/j.1468-0041.2004.00370.x>
- Norris, C., & Soloway, E. (2014). *Personalized learning: Is it?* *THE Journal*. Retrieved from <http://thejournal.com/articles/2014/12/04/personalized-learning.aspx>
- Rand Corporation. (2014). *Early Progress*, (November). Retrieved from <http://k12education.gatesfoundation.org/wp-content/uploads/2015/06/Early-Progress-on-Personalized-Learning-Full-Report.pdf>
- West, D. M. (2011). Using technology to personalize learning and assess students in real-time. *Center for Technology Innovations*, 1–14. <https://doi.org/080402r10.1103/PhysRevLett.98.080402>