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Assessing creativity in musical compositions: flow as an assessment tool

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This study was designed to examine any links between the concept of flow or optimal experience and the creative output of student compositions. The creative products of group compositions by university students (n = 45) were rated for creativity and on a number of standard criteria and compared with scores obtained from Experience Sampling Forms (Csikszentmihalyi & Csikszentmihalyi, 1988) completed by each participant. A significant correlation was found between optimal experience or flow levels of students and the quality of their group compositions as measured by creativity ratings. Some implications for educators and learners in the music classroom are explored and a proposed self-directed learning tool is discussed. Some of the issues on the assessment of creativity in music raised by Sheridan & Byrne (2002) are also discussed. This paper highlights the subjective nature of existing assessment procedures, considering whether examiners need extended criteria as opposed to a single dimension of creativity. The formative assessment nature of the flow paradigm is also explored.

Introduction

Musical creativity in the curriculum

In Scotland during the 1980s, musical creativity was placed on the agenda for pupils and teachers in secondary schools with the introduction of Standard Grade music (Scottish Examination Board, 1988). A number of influential reports at the time (Scottish Education Department, 1977a; Scottish Education Department, 1977b; Scottish Education Department, 1978) emphasised the need for schools to provide for children's creative and aesthetic development and to include opportunities for all to engage in imaginative and creative work in the arts (Byrne & Sheridan, 1998a). In music, this involved the introduction of a compulsory 'inventing' element in the new music syllabus for 14- and 15-year-olds, Standard Grade Music (Scottish Examination Board, 1988). Creative music-making was initially intended to lie at the heart of the curriculum in Scotland in such a way that a young person's creative endeavours would inform and enhance their understanding of performing and listening to music.

The SCARLATTI project[1] (Byrne & Sheridan, 1998a), established in 1997, looked at aspects of the teaching and learning of inventing (composing, improvising and arranging) in Scottish secondary schools. An important finding was that although there was a continuing increase in the numbers of students studying Standard Grade Music, attainment in inventing seemed to be relatively low. Teachers also seemed to be uncomfortable with teaching and assessing students' inventing work and with the practicalities of delivering the curriculum

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to growing numbers of students. It has been observed that teachers may be more concerned with ensuring that their students achieve a good pass grade in music at the expense of the development of a well-rounded, comprehensive musician (Byrne & Sheridan, 1998a). The demands of the examination system have therefore tended to shape teachers' attitudes and teaching strategies.

Teaching musical creativity

In the first two years of secondary education in Scotland, pupils are taught music in medium-sized classes (approximately 20 pupils) and gain experience in group performing, listening and inventing. A wide range of teaching and learning approaches is adopted by schools, ranging from 'Melody over chord progression' (the most popular) and 'Creating a bass part to a well-known tune' to 'Minimalist/process styles' and, the least popular, 'Sound collage' (Byrne & Sheridan, 2001). Research carried out as part of the SCARLATTI project revealed little evidence of structure in the approaches adopted by schools, with many inventing activities being free-standing and 'more of the same' (ibid.). While some teachers clearly believed that a single approach, such as improvisation, was likely to produce satisfying results, others were less convinced and tended to employ a range of approaches. There was also evidence to suggest that teachers' own experience of composing affected the ways in which they taught inventing. Teachers who had composing experience tended to provide fewer opportunities for students to engage in open-ended tasks in favour of more 'correct answer', formulaic work. Teachers who did not consider themselves composers, on the other hand, provided more open-ended activities for students. It is important that music teachers are familiar with teaching strategies for developing 'Creative Thinking in Music' (Webster, 2002) and for gaining greater understanding of the processes involved in composing, improvising and arranging. A fuller understanding of the creative process is of paramount importance to teachers and researchers in determining the ways in which teachers define and set targets for children in creative music-making in the classroom (MacDonald, Hargreaves & Miell, 2002). The research described here is an example of one way in which teachers can come to such an understanding.

Assessing musical creativity

In Scottish secondary schools, the curriculum changes of the mid-1980s have produced a system in which assessment drives the curriculum to the extent that 'assessment is even more visible and serious now, and therefore more demanding of teachers' (Bryce, 1999: 658). This is particularly true for the music curriculum, which seems to derive its 'grown-up' status from the fact that it is assessed in very similar ways to other more 'serious' subjects in the curriculum. The dominance of assessment procedures in Scottish secondary music education has been discussed by Sheridan & Byrne (2002), who raise five key factors that need to be addressed. These are:

1. that the premise that standards will rise with improved examination results is flawed;
2. that assessment drives teaching and learning;
3. that creativity is measured using flawed criteria;

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4. that the logistics of assessment result in teaching and learning time being lost;
5. that musical creativity is being stifled. (Ibid.)

It is not only in Scotland that problems with assessment have been encountered. Finney (2002) asserts that, due to the absence of a system of moderation between music departments in England, 'the critical place of assessment in the government's programme of improving standards was, in the case of music, a "birth-strangled babe"'(130). The problem is not confined to secondary schools. Colleagues in higher education music degree courses also spend much time reviewing, revising and, latterly, justifying the assessment processes adopted across courses. (For an insightful discussion of a range of diverse assessment approaches in a UK music degree, see Boyce-Tillman (2003).) New, holistic and constructive alignment (Biggs, 2003) approaches to teaching, learning and assessment are also being discussed by higher education institutions as the requirements of the United Kingdom's Quality Assurance Agency impact on university courses.

Paynter (2000: 5) asks whether, in music, we compromise the curriculum in order to make important what is easiest to assess or evaluate rather than assessing/evaluating those things that are truly important. One of us has argued before that inventing (composing, improvising and arranging) was included in the examination syllabus in Scotland in order to ensure that it would be taught (Byrne & Sheridan, 1998a). So the music curriculum may be compromised in two ways: first, by allowing what is relatively easy to assess to drive the content, and, second, by including creative music-making activities within the examination syllabus in order to ensure that teachers perceive them as being both valuable and serious. We would further contend that current methods of assessment place an emphasis on the completion of products or artefacts and are, therefore, summative in nature, thereby missing the original point of including inventing in the curriculum (MacDonald, Miell & Morgan, 2000).

Inventing is a compulsory component of the music examination syllabus at Standard and Higher Grade levels (exams at 15+ and 16+ respectively). There is some evidence that students engage in inventing activities reluctantly (Byrne & Sheridan, 2000) and that some music graduates reflect upon their experience of composing as 'a paper based, mathematical and rather mechanical activity' (Byrne, 2001; MacDonald, Miell & Mitchell, 2002). This should be of some concern to music teacher educators since it is expected that music teachers will have had experience of musical composition, although the views of Paynter (1982) and Mark (1978) that such experience is necessary in order to teach creative music-making have recently been questioned (Byrne & Sheridan, 2001; see further Byrne & Sheridan, 1998; Sheridan & Byrne, 2002). For the purposes of this discussion, we will focus on methods of assessment that ostensibly form an integral part of the learning process. In order for young people to develop new skills and techniques in composing and improvising it is necessary for them to operate at their own 'growing edge' of skill and knowledge development (Bereiter & Scardamalia, 1985).

Flow, or optimal experience

'Flow' may be described as the effortless involvement with everyday life and may occur when a person is engaged in absorbing and enjoyable activities.

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> The universal precondition for flow is that a person should perceive that there is something for him or her to do, and that he or she is capable of doing it. In other words, optimal experience requires a balance between the challenges perceived in a given situation and the skills a person brings to it. (Csikszentmihalyi, 1988: 30)

The characteristics of flow are clearly recognisable in many worthwhile pursuits and activities including sports, hobbies (Csikszentmihalyi, 1992) and musical performance (O'Neill, 1999). Csikszentmihalyi (1996) describes nine components of enjoyment that many people experience when engaged in activities such as sports and hobbies. Activities which ensure that 'there is no worry of failure', provide 'clear goals every step of the way' and instant feedback on the performance during the activity and which contain a balance between challenge and skill often provide individuals with the exhilarating feeling that is optimal experience, or flow. In addition, such pursuits also provide a feeling of time being altered and a state in which distractions are excluded from consciousness. Actions or decisions become automatic and feelings of self-consciousness disappear. Such pursuits and activities are also described as being 'autotelic' in nature since they provide their own goals and are therefore worth doing for their own sake. Activities can become rewarding experiences if 'the activity is structured right and if one's skills are matched with the challenges of the action. In this optimal condition, people enjoy even work, extreme danger, and stress' (Csikszentmihalyi, 1975: xiii).

The study of optimal experience (Csikszentmihalyi, 1988) in everyday life has extended to performance in sport (Jackson & Marsh, 1996) and in musical activities (O'Neill, 1999; Custodero, 1999). O'Neill's (1999) study made use of the flow model to explore and examine the motivational and social factors involved in learning to play a musical instrument. A method of observing young children's flow experience while engaged in musical activities has been developed by Custodero (1999). Studies of flow typically involve participants in completing self-report forms seven or eight times a day when contacted by radio pagers that are activated according to a random schedule. Information on respondents' awareness of dimensions of consciousness and personal experience are gathered over the course of a number of days (Massimini & Carli, 1988). Byrne & Sheridan (2000) have described a model for music education which utilises the flow concept, and it has also been suggested (MacDonald, Byrne & Carlton, under review) that the creative output of musicians can be positively correlated with levels of flow.

Consensual Assessment Technique

It has been argued that the assessment of creativity and creative products is, by its very nature, a subjective exercise regardless of the quality of the 'objective' criteria applied since these will be used by individuals who, naturally, apply their own subjective interpretations of the criteria (Amabile, 1983, 1996). Amabile has developed a reliable method for creativity assessment which is grounded in a consensual definition of creativity in which each rater is an appropriate observer:

> A product or response is creative to the extent that appropriate observers independently agree it is creative. Appropriate observers are those familiar with the domain in which the product was created or the response articulated. Thus, creativity can be regarded

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> as the quality of products or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced. (Amabile, 1996: 33)

Studies by Hickey (2000, 2002) have indicated that Consensual Assessment Technique is a reliable method of arriving at a creativity rating of children's compositions. This was confirmed by ratings of creativity for all children's compositions making use of the refined Measure of Creative Thinking in Music (Webster, 1994).

Amabile suggests three requirements of the task to be assessed. First, the task should lead to an identifiable product 'or clearly observable response that can be made available to appropriate judges to assess' (Amabile, 1996: 41). Second, the task should be open-ended enough to allow for a variety of individual responses in terms of flexibility and novelty. Third, it is desirable that there should 'not be large individual differences in baseline performance on the task' (ibid.). Appropriate judges are considered to be those who have sufficient experience, ability and expertise in the domain to be able to evaluate the work in question and to have developed their own implicit criteria for creativity and for other qualities of the work, such as aesthetic appeal, technical merit or form and structure.

Background

The Applied Music 1 class at the University of Strathclyde aims to assist musicians in developing and regulating their own thinking and learning skills. Upon completion of the course, graduates will be working in both formal and informal settings as teachers and workshop leaders and it is important that all students are prepared for work in a variety of contexts such as primary and secondary schools, special needs and community settings. While looking at a number of learning theories as part of the class, students are encouraged to reflect on how these fit with their own learning. Flow is one concept that is examined in some detail as being appropriate for learners and teachers. Students are encouraged to discuss occasions when their own skills and perceived challenges have not been in balance, causing states of anxiety, boredom and apathy.

Group discussion is part of the class and students use the Experience Sampling Form to facilitate group discussion and to provide a focus for reflection on class activities. A number of collaborative tasks are set in order to help students identify the range of skills needed for collaborative work and to build upon these during an extended project. Each task also requires students to develop awareness of their own feelings while engaged in a small group composing project through the completion of self-report forms. The task described in this paper is a group composing task which was framed in such a way as to optimise the contributions of each group member. In addition, 'critical thinking' was developed through the problem-solving approach to composing, and this may be transferable and be of benefit to students in other contexts (Byrne *et al*., 2001). Since the concept of flow was also embedded within the class, reflection upon the processes involved in the creation of the composition was also encouraged through the use of a modified version of the Experience Sampling Form (Csikszentmihalyi & Csikszentmihalyi, 1988).

Previous studies have made use of experience sampling methodology to gauge the quality of experience while subjects were engaged in everyday life. Participants were

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required to complete self-report forms at randomly selected times of the day. Since the students in our study were completing the report forms while engaged in the composing task, it was not necessary to ask such questions as 'Where were you?', 'What were you thinking about?' or 'Who were you with?' The use of our simplified version of Csikszentmihalyi's (1988) Experience Sampling Form (ESF) at the conclusion of each period of work was intended to help students reflect on what they had just been doing and to assist in planning for the next session. The only amendments made were the removal of redundant questions.

We were interested to find out whether or not optimal experience would occur if three of the conditions of flow were present during completion of the composing task. Also, if a high level of flow was present, might this be reflected in the quality of the group composition? The composing task was designed in such a way as to provide potential for the following three conditions of flow to be present:

1. *There were clear goals every step of the way*. Students were asked to meet at least three times to work at the composing task and to meet in groups of no more than three students. All students were given the choice from three musical stimuli and were given clear guidance on how to spend their time during the time allotted for the project.
2. *There was immediate feedback*. Questions on the ESF included 'How well were you concentrating?' and 'Was this activity important to you?', both of which, it was hoped, would help focus students' attention on the quality of the activity and their engagement with the task. In addition, we anticipated that students would naturally interact with one another during the composing task. In fact, evidence from a previous study (Byrne, Sheridan & Dalzell, 1999) had revealed that students did spend quite a lot of time talking and demonstrating musical ideas, and this is consistent with Guilford's review of the problem-solving nature of creative thinking (Guilford, 1967) during which the problem is defined, available information surveyed, incubation or unconscious work takes place and possible solutions emerge and are tested. For the purposes of this study it was assumed that much, if not all, of the above took place, and, since the focus of the study was not the nature of the interaction between students, no data was collected to either confirm or deny the various stages of the creative process (see further, Webster, 1988).
3. *There was a balance between challenge and skill*. The ESF asked students to rate their perceived levels of challenges and skills in relation to the activity. It is suggested that when the challenges and skills experienced during an activity are higher than one would normally experience (the subject mean) then flow may occur (Figure 1). In addition, the small size of each group was designed to encourage all students to contribute, and we would imagine that this would involve both musical and creative input to the completed task.

There is a perceived dissatisfaction with criteria-based assessment of creative products, particularly in schools. Consensual Assessment Technique (Amabile, 1983) is a well-documented and validated means of assessing creative products. In order to gauge the appropriateness of this technique for use in a higher education setting it was decided to compare it with the more conventional approach used within a music degree programme.

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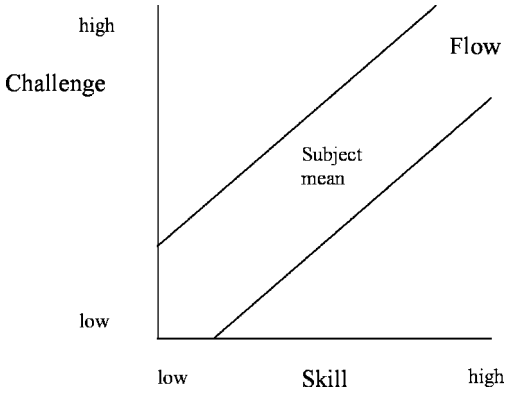


Fig. 1 Conditions in which flow may occur

This is standard psychometric practice when developing new educational and/or psychological assessment techniques (Anastasi, 1990).

Method

Participants

A total of 45 students took part in the study as part of the Applied Music class within the first year of a university music degree.

Materials

Students were provided with three musical stimuli and were asked to compose a piece of music based on their selected stimulus. Students worked in groups of no more than three and met over at least three occasions to create group compositions. Students were free to bring any instrument they wished to each session. In addition, each student was supplied with three ESFs.

Procedure

Students met at times of their own choosing over the course of a two-week period. At the next session of the class, all group pieces were recorded using a fixed microphone set-up, mixing desk and mini disc recorder. Thereafter, students ($n = 31$, 69 per cent of the total number of students) used Consensual Assessment Technique to rate all 16 group compositions for creativity using a seven-point scale (Amabile, 1983, 1996; Hickey, 2000). Meanwhile, all student compositions were also rated for creativity by two groups of specialists who had experience of teaching and assessing composition. The first group was of experienced music lecturers (experienced raters, $n = 9$) working in the university

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department, and the second was of trainee teachers (postgraduate student raters, $n = 15$) on the Postgraduate Certificate in Education course at the university. In order to compare the two methods of assessment, the experienced raters also assessed each composition on a standard set of criteria (staff criteria score) as used in the music degrees taught within the department. The experienced raters were asked to consider the phrase: 'Using your own definition of creativity, rate the degree to which each composition is creative' (Hickey, 2000: 11) and to rate each composition in turn before rating each one using the staff criteria scores method. Responses were then collated and analysed using SPSS software.

Individual and group scores were produced from the ESFs by totalling scores for all categories. Standard procedure is that all scores for individuals are normalised to reflect activities that produce a mean level of flow for each individual (Massimini & Carli, 1988). This was not necessary in the present study since participants were meeting at specific times to carry out a designated task, i.e. prepare a group composition, and therefore no subject mean was available. Two sets of scores were generated by the ESFs: a mean of three scores for each individual student and a group mean of all nine individual scores.

Results

The results reported here focus exclusively upon the issues related to assessing creativity within an educational context. (MacDonald, Byrne & Carlton (under review) discuss wider psychological issues relating to the results in more detail.) Descriptive statistics displaying means and standard deviations for key variables of interest are presented in Table 1.

In order to investigate the relationship between the different methods of assessment, Spearman correlations were calculated. Two important strands emerged from the data. Firstly, there was a significant correlation between the staff criteria score and the staff rating for creativity ($r = .76$, $p < .01$), which suggests that Consensual Assessment Technique is related to the set of seven criteria commonly used in music degree courses at the university. Secondly, there was a significant correlation between scores on the Experience Sampling Form and the ratings for creativity given by the postgraduate students ($r = .39$, $p < .01$).

This is a significant finding and, if borne out by further studies, could be of value as a starting point for the formal assessment of creative music-making projects within the examination system. The fact that a high-quality composition can be created by a small group of students who are likely to be in flow is an important result as this finding extends the work of previous researchers interested in applying the concepts of flow to a creative environment.

Paired sample *t*-tests revealed that there were significant differences between the average marks for creativity given by each of the groups. In particular, the postgraduate scores for creativity were significantly lower than the lecturers' marks for creativity $t\,(44) = 9.98$, $p < .01$. The postgraduate scores were also significantly lower than the students' marks for creativity $t\,(44) = 11.83$, $p < .01$. Also, the students' marks given for creativity were significantly higher than the lecturers' marks given for creativity, $t\,(44) = 6.32$, $p < .01$. Table 2 displays the means and standard deviations for these measures.

Reliability analysis on the assessments scales produced acceptable alpha coefficients of .89 for the creativity measures, .92 on ESF measures and .90 for the staff criteria measures.

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Table 1 *Descriptive statistics (standard deviations in brackets)*

Group	Mean ESF (0–241)	Mean lecturer ($n=9$) creativity rating (1–7)	Mean post-graduate ($n=15$) creativity rating (1–7)	Mean student ($n=31$) rating (1–7)	Mean lecturer ($n=9$) criteria score (0–21)
A	181.27 (21.21)	4.33 (1.00)	3.93 (1.39)	5.41 (1.15)	13.11 (2.71)
B	184.93 (32.84)	4.11 (1.54)	3.67 (1.50)	3.74 (1.39)	12.78 (4.32)
C	183.56 (21.21)	4.78 (1.09)	4.27 (1.75)	6.35 (0.91)	14.22 (3.90)
D	154.77 (36.74)	4.00 (0.87)	2.80 (1.61)	4.16 (1.21)	12.44 (3.24)
E	161.00 (34.87)	2.67 (0.87)	2.40 (1.18)	5.03 (1.11)	10.44 (2.60)
F	159.56 (21.04)	4.33 (1.12)	3.20 (1.66)	4.52 (1.36)	12.67 (2.74)
G	166.65 (22.78)	3.56 (1.59)	2.87 (0.99)	5.16 (1.37)	13.00 (4.80)
H	145.17 (31.81)	4.44 (1.42)	3.60 (1.68)	4.29 (1.13)	14.00 (3.87)
I	131.33 (24.48)	2.56 (1.33)	1.80 (0.68)	5.19 (1.19)	9.00 (4.12)
J	170.51 (25.45)	1.44 (0.73)	1.33 (0.82)	4.23 (1.09)	6.00 (3.39)
K	155.76 (42.13)	3.22 (0.97)	2.33 (0.98)	3.32 (1.17)	10.33 (2.29)
L	158.20 (16.13)	4.89 (0.78)	3.53 (1.46)	3.77 (1.43)	14.56 (2.65)
M	143.29 (7.56)	3.44 (1.13)	2.47 (1.06)	4.90 (1.42)	10.44 (2.24)
N	158.11 (32.95)	5.56 (0.88)	4.80 (1.32)	5.42 (1.18)	15.56 (2.70)
O	155.42 (29.16)	3.56 (1.24)	3.47 (1.55)	6.45 (0.85)	11.33 (3.67)
P	193.06 (15.54)	4.00 (1.12)	4.13 (1.19)	5.55 (0.89)	12.89 (2.85)

Table 2 *Ratings for a single measure of creativity*

Rating group	Mean score	Standard deviation
Lecturers ($n=9$)	3.78	1.00
Postgraduates ($n=15$)	3.16	0.94
Students ($n=31$)	4.91	0.86

Discussion

There are implications for university music teaching staff concerning the ways in which student compositions are assessed. The use of standard sets of criteria is widespread in the assessment of creative music-making in schools in the United Kingdom and the United States, and a variety of models exist (Webster & Hickey, 1995; Webster, 2000). Staff time is both valuable and expensive and a more economic model of assessment procedures could be developed. Consensual Assessment Technique has provided evidence (Amabile, 1996; Hickey, 2000) that it can be a robust and reliable technique for arriving at a final grading for creative works. We would suggest that Consensual Assessment Technique has the potential to be used as an alternative to the more problematic criteria-based approaches. For example, studies, including the present one, suggest that experienced raters may take

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into account the many factors of criteria-based methods while subjectively rating musical compositions on the single dimension of creativity. However, further research is required in order to ascertain fully the psychometric validity and reliability of this approach.

While these assessment procedures may be of benefit to staff and students in universities and colleges, there may be the potential to develop its use within the secondary school music classroom. Byrne & Sheridan (2000) suggest that a powerful reflective tool for teachers can be developed using the flow model. Such a tool would be valuable to teachers in initiating, planning, monitoring, regulating and assessing learning. In other words, flow could be used to manage the learning environment. It has been observed that both formative assessment and marking criteria are 'necessary in an examination system that rewards attainment with certificates of achievement', but that it should be possible to 'develop assessment tools designed to assist the novice composer in building skills while also enjoying the experience' (Sheridan & Byrne, 2002).

Some further details regarding the nature of the task employed in this study also have implications when interpreting the results. For example, the composing task that formed part of this study was designed primarily as a learning vehicle for students and the rating of each composition did not generate any mark or grade. As a result, it is possible that students felt relaxed and less anxious than if the task had been carried out as part of the class assessment. Similarly, students were required to work in groups rather than completing creative music assignments on an individual basis.

In terms of designing of the composition task a number of factors were relevant. In searching for the optimum size of group for such a collaborative task, we were guided by some previous work by North *et al*. (2000) as well as by the experience of teaching the Applied Music class in the preceding academic session. Limiting the size of the group to three reduced the likelihood that 'social loafing' would be present, since this is more likely in larger groups. Moreover, since all students were asked to choose from the same three musical stimuli, the composing task for each group might be described more as group extemporisation.

As all students were studying at SD (Scottish Degree) 1 level and were also taking the 'Creative Skills' class at the same level it can be assumed that the whole group were more or less at the same level of ability in composing. That there should be no great disparity in ability levels is a requirement of the Consensual Assessment Technique (Amabile, 1996). However, clearly some students are more at home in one or more musical genres and, since the course accepts students from a wide range of backgrounds such as jazz and traditional music, it was inevitable that there would be a mixture of musical influences and preferences within each group. Groups were selected for a non-musical classroom exercise earlier in the class and these, in turn, became the groups for the composing task.

The significant correlations between levels of creativity and levels of optimal experience suggest that students who produced high-quality creative work really enjoyed the experience. Of course, it could also be said that students who fully engaged with the composing task and whose levels of skill and challenge were higher than they would normally experience in turn produced high-quality compositions. Clearly, as educators, this is the sort of effect that was both predicted and hoped for.

If classroom tasks are designed to be stimulating and engaging for students then there may be a strong likelihood that the quality of work produced will be high. When students

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produce such high-quality work in class, they tend to feel higher levels of satisfaction and are able to discuss the processes involved in a lively and interesting manner. The 'autotelic' nature of such classroom tasks means that the learning experience is enjoyable and, crucially, one that students are eager to repeat.

An important point to take into consideration when discussing the results of this study is when the raters undertook the assessment procedures. Specifically, the first rating using consensual assessment could have influenced the second rating using conventional criteria. By this we mean that the raters may have given similar marks on both scales because the procedure required them to carry out two different types of rating one after another. Thus, their scoring on one set of marking criteria could have influenced their score on the second set of criteria. One way of overcoming this potential confound is to specifically ask raters to mark the compositions at two different times separated by an arbitrary time period (e.g. two weeks).

Developing a self-regulation tool

In completing ESFs, students in our study indicated their moods and feelings over 28 different variables. Two of the key variables, challenges and skills, have been found to be good indicators of flow when they 'are above a certain level, and are in balance' (Csikszentmihalyi & Csikszentmihalyi, 1988: 260). Similarly, when students report feeling 'active', 'happy', 'strong', 'clear' and 'involved' it can be assumed that there is some sense of well-being and that some of the conditions of flow are present. As educators we are particularly interested in the quality of our students' learning and in ensuring that the learning process produces a positive experience. Remembering that opportunities for success can also be opportunities for failure (Clarke & Haworth, 1994), activities can be designed that build on the learner's existing skills and take account of the level of challenge presented by any new activity. Csikszentmihalyi and Csikszentmihalyi describe one possible scenario:

> For instance, a beginning piano player will see learning the keys corresponding to the various notes as challenging, and might feel in flow simply by running the scales on the keyboard. As soon as the player feels confident with the scales, however, new challenges need to be found or he or she will get bored. (Csikszentmihalyi & Csikszentmihalyi, 1988: 261)

We can envisage a teaching and learning tool that makes use of the flow model in which the learner is kept on-task, regular and immediate feedback is given, clear targets are well defined and achievable, and in which there is a balance between challenges and skills. Of course, activities in which participants can attain feelings of flow are likely to be highly intrinsically rewarding in themselves.

The present study has shown that it is possible to achieve high-quality creative output in musical composition and that a directly related flow state can occur. Music educators may like to consider a refined version of the Experience Sampling Form which acts as a self-regulatory tool for the learner. The attainment of high levels of flow would be a strong indicator of progress by the learner and of good-quality attainment in creative music-making. We would argue that such a tool could also be used in solo performance and

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ensemble settings where skill levels are matched to the degree of challenge presented by the musical task. Many of our students report feeling bored when they have been the most experienced members of school orchestras and anxious when they are, in their view, the least experienced member of the university orchestra. Of course, few composers deliberately write music that will keep all learners engaged to the same degree throughout the music, but good teachers who are also composers and arrangers do. Differentiated parts for a variety of ability levels are an established part of the secondary school music curriculum in Scotland. The use of a simplified ESF would allow teachers to check on how successful this differentiation has been by providing evidence of all students' feelings about their experience of performing the music. Such a version of the ESF would also allow the balance between skills and challenge to be monitored and adjusted by both the learner and the teacher. This would apply equally well to solo and ensemble situations.

As a vital component of the learning process, feedback on success provides motivation for continued effort, given the likelihood of further success. A number of social–psychological theorists support the view that success, which confirms a level of competence, can lead to an increased level of motivation (Lepper & Greene, 1978; MacDonald, Davies & O'Donnell, 1999). Educators also need to bear in mind that complete success at a task, such as composing, is unlikely to lead to repetition of the same task but, rather, to a similar or more challenging task being attempted (Amabile, 1996). Children are more likely to experience flow when they are engaged in activities that they consider enjoyable, not ones that their teachers think should be enjoyed by the child.

Note

1 SCARLATTI: Strathclyde Consortium for Action Research in Learning Approaches and Teaching Techniques in Inventing.

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